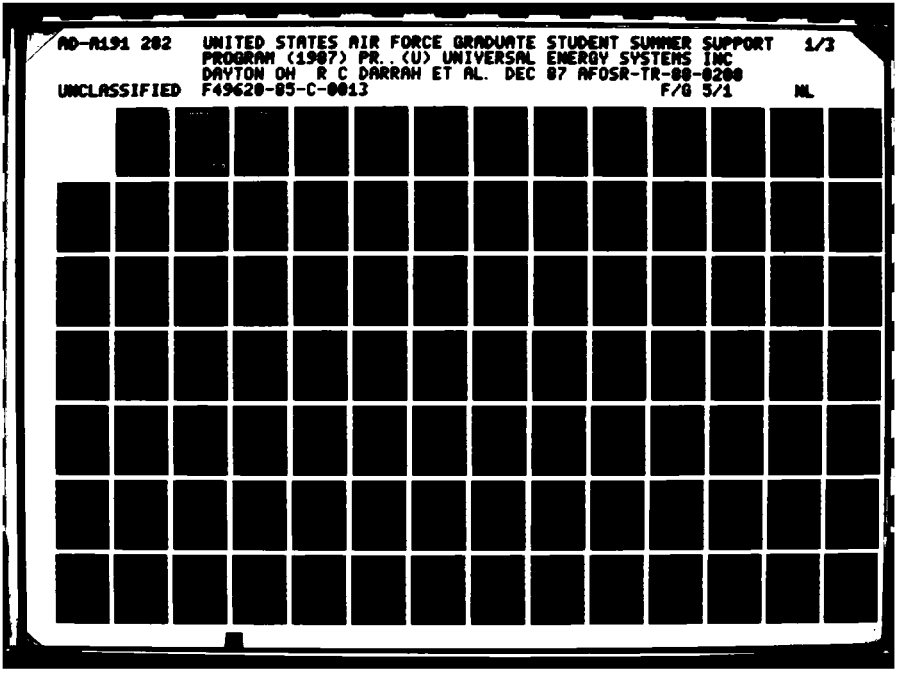
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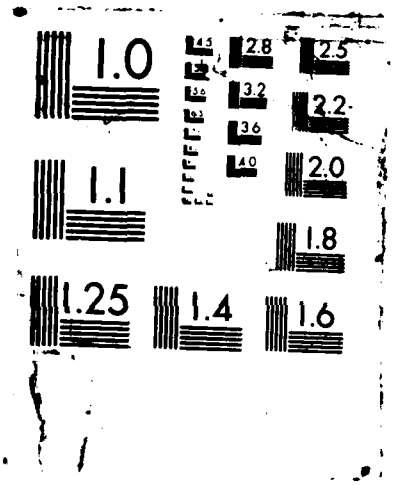
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UNITED STATES AIR FORCE

GRADUATE STUDENT SUMMER SUPPORT PROGRAM

1987

PROGRAM MANAGEMENT REPORT

UNIVERSAL ENERGY SYSTEMS, INC.

Program Director, UES
Rodney C. Darrah

Program Administrator, UES
Susan K. Espy

Program Manager, AFOSR
Major Richard Kopka

Submitted to

Air Force Office of Scientific Research

Bolling Air Force Base

Washington, DC

December 1987

AFRPL-TR-87-077

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I. INTRODUCTION

Universal Energy Systems, Inc. (UES) was awarded the United States Air Force Summer Faculty Research Program on August 15, 1984. The contract is funded under the Air Force Systems Command by the Air Force Office of Scientific Research.

The program has been in existance since 1978 and has been conducted by several different contractors. The success of the program is evident from its history of expansion since 1978.

The Summer Faculty Research Program (SFRP) provides opportunities for research in the physical sciences, engineering, life sciences, business, and administrative sciences. The program has been effective in providing basic research opportunities to the faculty of universities, colleges, and technical institutions throughout the United States.

The program is available to faculty members in all academic grades: instructor, assistant professor, professor, department chairman, and research facility directors. It has proven especially beneficial to young faculty members who are starting their academic research programs and to senior faculty members who have spent time in university administration and are desirous of returning to scholarly research programs.

Beginning with the 1982 program, research opportunities were provided for 17 graduate students. The 1982 pilot student program was highly successful and was expanded in 1983 to 53 students; there were 84 graduate students in the 1984 program.

In the previous programs, the graduate students were selected along with their professors to work on the program. Starting with the 1985 program, the graduate students were selected on their own merits. They were assigned to be supervised by either a professor on the program or by an engineer at the Air Force Laboratories participating in the program. There were 92 graduate students selected for the 1985 program.

Again in the 1986 program, the graduate students were selected on their own merits, and assigned to be supervised by either a professor on the program or by an engineer at the participating Air Force Laboratory. There were 100 graduate students selected for the 1986 program.

Follow-on research opportunities have been developed for a large percentage of the participants in the Summer Faculty Research Program in 1979-1983 period through an AFOSR Minigrant Program.

On 1 September 1983, AFOSR replaced the Minigrant Program with a new Research Initiation Program. The Research Initiation Program provides follow-on research awards to home institutions of SFRP participants. Awards were made to approximately 50 researchers in 1983. The awards were for a maximum of $12,000 and a duration of one year or less. Substantial cost sharing by the schools contributes significantly to the value of the Research Initiation Program. In 1984 there were approximately 80 Research Initiation awards.

I. INTRODUCTION

Universal Energy Systems, Inc. (UES) was awarded the United States Air Force Summer Faculty Research Program on August 15, 1984. The contract is funded under the Air Force Systems Command by the Air Force Office of Scientific Research.

The program has been in existance since 1978 and has been conducted by several different contractors. The success of the program is evident from its history of expansion since 1978.

The Graduate Student Summer Support Program (GSSSP) is conducted as part of the Summer Faculty Research Program.

The program provides opportunities for research in the physical sciences, engineering, life sciences, business, and administrative sciences. The program has been effective in providing basic research opportunities to the Graduate Students of universities, colleges, and technical institutions throughout the United States.

The program is available to Graduate Students enrolled in either Masters Degree or Doctorate Programs. It has proven especially beneficial to the students who are starting their academic research programs.

Beginning with the 1982 program, research opportunities were provided for 17 graduate students. The 1982 pilot student program was highly successful and was expanded in 1983 to 53 students; there were 84 graduate students in the 1984 program, 92 in the 1985 program and 100 in 1986.

In the previous programs, the graduate students were selected along with their professors to work on the program. ~~Starting with~~ For the 1985 program, the graduate students were selected on their own merits. They were assigned to be supervised by either a professor on the program or by an engineer at the Air Force Laboratories participating in the program.

Again in the 1987 program, the graduate students were selected on their own merits, and assigned to be supervised by either a professor on the program or by an engineer at the participating ~~Air Force Laboratory~~. There were 101 graduate students selected for the 1987 program.

A pilot program for Graduate Student Summer Research via the AFOSR Summer Faculty Research Program (SFRP) was initiated in 1982. The program was developed as an adjunct effort to the SFRP. Its purpose is to provide funds for selected graduate students to work at appropriate Air Force laboratories or centers with supervising professors who hold concurrent SFRP appointments.

For the 1987 GSSSP, emphasis was placed on selecting graduate students to be placed with either supervising professors on the SFRP or with the Air Force laboratory/center engineers. There were 178 GSSSP applicants. A total of 101 graduate students were selected to participate in the 1987 program.

II. RECRUITING AND SELECTION

The program is conducted on a nationally advertised and competitive selection basis. Advertising for the 1987 program was conducted via direct mail to all accredited schools. The mailing was sent to the department chairman at the schools. The departments included biology, genetics, ecology, entomology, chemistry, computer science, graphics, mathematics, physics, aeronautical engineering, ceramic engineering, chemical engineering, materials science, mechanical engineering, electrical engineering, metalurgy, nuclear science, and psychology. The brochures were also mailed to all of the participants in the 1985 and 1986 programs. Brochures were mailed to the Presidents of Historically Black Colleges. The brochures were sent to all participating USAF laboratories/centers; distribution was made through AFROTC units on university campuses; information was supplied to all who made requests. Overall, more than 12,000 brochures were distributed throughout the country.

In 1982, 91 faculty and 17 students participated in the program. In 1983, 101 faculty and 53 students participated. In the 1984 program there were 152 faculty members and 84 graduate students appointed to the Air Force facilities. For the 1985 program, 154 faculty members and 92 graduate students were assigned to the Air Force laboratory/centers. In 1986, there were 158 faculty and 100 graduate student participants. The 1987 program had 159 faculty and 100 graduate student participants.

Application deadline for the GSSSP was April 15, 1987. The announcements of selections were mailed on April 25, 1987.

The 1987 SFRP is published as four separate documents. The reports are entitled Summer Faculty Research Program Management Report and Technical Reports, Volume I, II and III.

III. SITE VISITS

Visits listed below include those by UES and AFOSR personnel. The faculty, USAF research colleagues, and student participants are generally satisfied with the program. Criticisms were: a) too much paper work to administor program, b) housing difficult to find, c) 10 weeks too short for research period.

June 9, 1987	Rome Air Development Center Griffiss Air Force Base, New York
June 11, 1987	Electronics Systems Division Geophysics Laboratory Hanscom Air Force Base, Massachusetts

June 17, 1987	Wright-Patterson Air Force Base Dayton, Ohio
June 22, 1987	Logistics Management Center Gunter AFS, Alabama
June 24, 1987	Engineering and Services Center Tyndall Air Force Base, Florida
June 25, 1987	Armament Laboratory Eglin Air Force Base, Florida
June 29, 1987	Defense Equal Opportunity Management Institute Patrick Air Force Base, Florida
June 30, 1987	Eastern Space and Missile Center Patrick Air Force Base, Florida
July 2, 1987	Arnold Engineering Development Center Arnold Air Force Station, Tennessee
July 9, 1987	School of Aerospace Medicine HRL: Training Systems Division HRL: Manpower and Personnel Division Occupational and Environment Health Laboratory Brooks Air Force Base, Texas
July 14, 1987	Rocket Propulsion Laboratory Edwards Air Force Base, California
July 15, 1987	Wright-Patterson Air Force Base Dayton, Ohio
July 23, 1987	HRL: Operations Training Division Williams Air Force Base, Arizona
July 24, 1987	Weapons Laboratory Kirtland Air Force Base, New Mexico
July 27, 1987	Frank J. Seiler Research Laboratory United States Air Force Academy, Colorado

Because of the proximity of UES to Wright-Patterson Air Force Base, several site visits were made to the following laboratories:

Aero Propulsion Laboratory
Armstrong Aerospace Medical Research Laboratory
Avionics Laboratory
Business Research Management Center
Flight Dynamics Laboratory
Human Resources Laboratory
Logistics Command
Materials Laboratory
Wright-Patterson Air Force Base, Ohio

We find that the objectives of the GSSSP are being well served. Summer Fellows indicate that they are performing independent research, and are not being used as "summer help". We have found no abuse of the non-personal services requirements. Research fellows often conduct lectures and seminars at the Air Force locations.

As a record of the documentation supplied to the appointees, the UES Information and Appointment Packets are provided in Appendix I of this report.

IV. HISTORICALLY BLACK COLLEGES/UNIVERSITIES (HBCU's)

In support of with the Summer Faculty Research Program, and as part of the UES EEO/Affirmative Action Program, UES sponsored an information booth at the NAFEO (National Association for Equal Opportunity in Higher Education) Conference. The conference was held on April 9 through 12, 1987. UES provided information on the UES-AFOSR summer programs at this conference.

UES visited various Historical Black Colleges and Universities throughout the country. During these visits faculty and administrators were briefed on the benefits and research opportunities of the SFRP. The targeted groups within the University community were faculty of the Engineering, Physics, Mathematics, Life Sciences, Physical Sciences, and Computer Sciences Departments.

The objectives of the visits are to encourage administration support and faculty participation. The program's reception at each institution was very good.

Below is a summary of universities that were visited and the date:

OCTOBER 1986

Atlanta University, Atlanta, GA	October 1
Spelman College, Atlanta, GA	October 1
Morris Brown College, Atlanta GA	October 2
Clark University, Atlanta, GA	October 2
Morehouse College, Atlanta, GA	October 3
Florida A&M, Tallahassee, FL	October 6
Tennessee State, Nashville, TN	October 16
Fisk University, Nashville, TN	October 16
Meharry Med. College, Nashville, TN	October 17
Norfolk University, Norfolk, VA	October 23
Hampton University, Hampton, VA	October 24

NOVEMBER 1986

LeMoyne-Owen College, Memphis, TN	November 3
Grambling University, Grambling, LA	November 4
Southern University, Baton Rouge, LA	November 5
Xavier University, New Orleans, LA	November 6
Dillard University, New Orleans, LA	November 6

Southern University, New Orleans, LA	November 7
Kentucky State, Frankfort, KY	November 10
Alabama A&M Univ., Huntsville, AL	November 24
Tuskegee Institute, Tuskegee, AL	November 25
Alabama State Univ., Montgomery, AL	November 26

DECEMBER 1986

N.C. A&T Univ., Greensboro, NC	December 9/10

JANUARY 1987

Jackson State Univ., Jackson MS	January 15
Tougaloo Univ., Tougaloo, MS	January 16
Texas Southern Univ., Houston, TX	January 17/18
Prairie View A&M, Prairie View, TX	January 19/20
University of Puerto Rico, San Juan	January 21/22
University of Puerto Rico, Mayaguez	January 23/24

APPENDIX I

This appendix presents the following documents which were distributed to appointees and other program participants.

A. Information Brochure for Summer Fellows.

B. Questionnaire for participants and a summary of their replies.

C. Questionnaire for Air Force laboratory representative and a summary of their responses.

D. Questionnaire for Research Colleague and a summary of their replies.

APPENDIX 1.A

INFORMAION BROCHURE

for

SUMMER FELLOWS

on the

1987 USAF-UES GRADUATE STUDENT SUMMER SUPPORT PROGRAM

March 1987

TABLE OF CONTENTS

I. SUMMER FELLOW OBLIGATIONS

Universal Energy Systems, Inc. (UES) is required by contract to impose certain obligations on you in your status as a Summer Fellow. This section outlines those obligations, and you should read them thoroughly. Your are required to sign and return the statement of understanding before the final processing of your appointment can be completed. The following is a list.

1. Research Goals and Objectives: A statement of research objectives must be provided to UES PRIOR TO the start of the summer research period. It should outline your goals and the approach you intend to follow in researching these goals. Neither travel expenses nor expense allowances will be reimbursed until after receipt of your statement of research objectives. The report should also clearly indicate the date of your first working day of the summer research period. If you are working with a professor during the appointment, the goals and objectives may be the same as submitted by the professor.

2. Final Report: At the end of your summer research effort, you are required to submit to UES a completed, typewritten scientific report stating the objectives of the research effort, the approach taken, results, and recommendations. Information on the required report format will be sent to you with a "FINAL REPORT INFORMATION BULLETIN" and sample report illustrating a suggested format. The final report must first be approved by your Effort Focal Point and then transmitted so as to reach UES by Wednesday, September 30, 1987. Payment of "Compensation" for the final two weeks of your ten-week research period cannot be made until UES has received and approved this report in the required format.

3. Program Evaluation Questionnaire: You will be sent a critique form to complete near the end of your research period regarding your impressions of the program. This critique form should be completed and returned to UES, along with your final report, by Wednesday, September 30, 1987. The return of this form is a program requirement; it also must be received by UES before the final compensation payment can be made.

4. U.S. Air Force - Summer Fellow Relationship: The U.S. Air Force and UES understand and agree that the services to be delivered by Summer Fellows under this contract will be non-personal services and the parties recognize and agree that no employer-employee or master-servant relationships will exist between the U.S. Air Force and the Summer Fellows. Non-personal services are defined as work performed by an individual who is responsible for an end item, such as a report, free of supervision of the U.S. Air Force and free of an employer-employee relationship.

As a Summer Fellow, you will not:

(a) Be placed in a position where you are appointed or employed by a Federal Officer or are under the supervision, direction, or evaluation of a Federal Officer, military or civilian.

(b) Be placed in a staff or policy-making position.

(c) Be placed in a position of command, supervision, administration, or control over Air Force military or civilian personnel or personnel of other contractors or become a part of the U.S. Air Force organization.

The services to be performed under the GSSSP do not require UES or the Summer Fellow to exercise personal judgement and discretion on behalf of the U.S. Air Force; rather, the Summer Fellows will act and exercise personal judgement and discretion on their research programs on the GSSSP conducted by UES.

The Air Force will have unrestricted use of and access to all data developed during the period of this appointment.

II. ALLOWABLE TRAVEL EXPENSES

If you live outside of the area (50 miles) where you will be assigned for the summer program, the GSSSP provides potential funding for the trip between your home and your assigned research location. As soon as you have signed and returned your appointment letter along with the budget sheet, you will be authorized to receive reimbursement for travel expenses as described below.

You are expected to make your own arrangements for this trip, and after the trip you may invoice UES for reimbursement of allowable expenses in the format described in the Instructions for Invoicing for Compensation and Reimbursement section of this brochure. Closely coordinate your travel plans with your EFFORT FOCAL POINT or your supervising professor.

All travel reimbursements under Summer Fellow appointments are made according to current UES policy, and deviations from the approved budget are not authorized and will not be reimbursed. In light of these restrictions, you may choose either to travel by common carrier at coach rates or less, by driving your private auto, or by a combination of both. With any of these choices you may claim reimbursement up to the amount for the most direct routing, taking into the account the desirability of routing on interstate highways if you drive your private auto.

Reimbursement for direct route travel by common carrier will be paid on your submission of an invoice to UES following the invoicing instructions referenced above. In the view of the convenience of having a car at the research location, UES strongly recommends that a private auto be used for travel when practical. Reimbursement when you drive your private auto is at the rate of 20¢ per mile within the above routing restrictions and will be paid on submission of a suitably prepared invoice. These reimbursements cannot be extended to cover travel by your family if they accompany you on either of these authorized trips.

During the ten week summer research period, you will be authorized to receive an expense allowance in lieu of a per diem payment at a rate of $30 per day for a maximum of 70 days. To receive this allowance, you must invoice for it and be living (50 miles) outside your area of residence.

These items above are the only reimbursable travel allowances authorized under the GSSSP appointment. Any additional travel expenses incurred during the appointment period will be your personal responsibility.

UES has arranged with a travel office in Dayton, Ohio, to have the air fare costs of your travel on the SFRP charged directly to UES. For you to take advantage of this, you must call this travel service. The number in Dayton, Ohio, is 293-7444 or 1-800-628-6668. You must give the code SLI3 to have the tickets charged to UES.

If you require a cash advance for the start of the program, please indicate the amount on the bottom of your budget sheet. The cash advance will be deducted from payments of your bills of service.

III. INSTRUCTIONS FOR INVOICING FOR COMPENSATION AND REIMBURSEMENT

Attached is a copy of the Invoice Format that you are required to use to obtain compensation or reimbursement from UES. Note that all disbursements by UES for compensation, travel, and/or other expenses are subject to audit approval, so you must submit receipts substantiating charges invoiced.

In addition, you must prepare, sign, date and attach to each completed invoice a Brief Report of Effort

A. PREPARATION OF BRIEF REPORT OF EFFORT

Whenever you submit an Invoice for reimbursement to UES you must also include a brief report describing your activities for the invoice period. To meet this obligation, you must prepare, date, sign, and attach to your completed invoice a Brief Report of Effort describing the research accomplished on the appointment and explain any travel during the invoice period.

This report should describe innovative techniques and designs or discoveries which may be disclosed as patents. Rights to any inventions or discoveries shall reside with UES unless determined otherwise by the contracting agency.

The Brief report should never exceed one typewritten page and most often should be considerably shorter than one page.

B. PREPARATION OF INVOICE FORMAT

The financial items required on the Invoice Format are for COMPENSATION, TRAVEL, EXPENSE ALLOWANCE, AND PER DIEM.

Item (1) SOCIAL SECURITY/MAILING ADDRESS

Fill in your name, social security number, and address to which you wish to have your check mailed.

Item (2) COMPENSATION

(a) Indicate the dates for which you are claiming compensation, and indicate the number of days you are claiming for compensation.

(b) Multiply this number by $63.67 for B.S. degree holders and enter the total dollar amount in the blank total charges for service. The accumulated total number of days you claim on this appointment may not exceed the number authorized in your appointment letter.

Item (3) TRAVEL

(a) Under the heading Date indicate the date you departed on your trip and the date you arrived at your destination. If you are invoicing for a round trip, also list the date you departed on your trip and the date you arrived home.

(b) Under the heading Dept/Arrival Time list the departure and arrival times for the corresponding days you listed under Date.

(c) List your destination under the heading Destination.

(d) Under the heading Mode, indicate your principal means of conveyance; i.e., commercial air, private auto, etc

(e) Under the heading Amount, itemized these expenditures for travel reimbursement. Continue them on a separate sheet if necessary.

(f) Total these travel items and enter the dollar amount for travel in this invoice on the line to the right of Total Travel Expense.

Item (4) EXPENSE ALLOWANCE

This item on the invoice will be used to claim the $30 per day for reimbursement of costs incurred at your assigned research location.

(a) In the first blank to the right of EXPENSE ALLOWANCE enter the number of days for which you are claiming the expense allowance at your assigned research location.

(b) Multiply this number by the daily allowance rate of $30.00 and enter this total dollar amount in the blank at the far right.

(c) Itemize the days for which you are claiming the Expense allowance reimbursement. It can include weekend days and holidays as well as regular work days.

Item (5) PER DIEM

This item is not applicable to the GSSSP.

Item (6) INSTRUCTIONS

You may combine reimbursement requests for compensation, travel, and Per diem or expense allowance in the same invoice. The total for all items invoiced should be indicated on the blank on the right hand side of line 7.

If you have arranged your travel through the UES travel office as described on page 4, please indicate the cost of the tickets on this line.

IMPORTANT: Indicate in the space provide on each invoice the address to which you want the check mailed.

You must sign and date your invoice in the lower left hand corner as "Summer Fellow" before it is submitted; you MUST also have your Effort Focal Point countersign the invoice before it is mailed to UES Your Effort Focal Point is an Air Force individual at your research location who will be identified prior to your effort start date.

Invoices should be mailed to:

Universal Energy Systems, Inc.
GSSSP Office
4401 Dayton-Xenia Road
Dayton, Ohio 45432

IV

BILL FOR SERVICE

1. _____ _____
Name (First, Initial, Last) Social Security #

_____
Address (Street, City, Zip)

SERVICE: GSSSP Summer Fellow

SERVICE AUTHORIZED BY: Rodney C. Darrah

RATE AUTHORIZED: $63.67/day for B.S. Degree

This service is for:
Government Contract: Project # 760
Government Contract No. F49620-85-C-0013

2. DATES OF SERVICE: _____ TOTAL DAYS OF SERVICE _____

TOTAL CHARGES FOR SERVICE: _____

ADDITIONAL ITEMIZED REIMBURSABLE EXPENSES:
(receipts required for expenditures over $25.00)

3. TRAVEL: DATE _____ DEPT/ARRIVAL TIME _____

DESTINATION _____ MODE _____ AMOUNT _____

4. EXPENSE ALLOWANCE: (_____ days at $30.00/day) $_____

5. PER DIEM: (Not Applicable)

6. TOTAL AMOUNT OF BILL: _____

7. AIR FARE TICKETS CHARGED DIRECTLY TO UES. AMOUNT: $_____

_____ _____
Summer Fellow Signature - Date Telephone

Invoice Approval: _____
Effort Focal Point Signature

X_____ Brief Report of Effort
Type or Print Name Attached _____

Location: _____

Telephone: _____

Date: _____

Send bill to:
UNIVERSAL ENERGY SYSTEMS, INC.
ATTN: GSSSP Office
4401 Dayton-Xenia Road
Dayton, Ohio 45432

In order for UES to provide quick turn around of your bills for service, we request your assistance in complying with the following schedule. The dates indicated are the dates your bills MUST be at UES. Please allow adequate mailing time for UES to receive your bills by the dates indicated

April 6, 20
May 4, 18
June 1, 15, 29
July 13, 27
August 10, 24
September 7, 21
October 5, 19

For bills received on or before these dates, UES will be able to process checks to you in the mail by the following Thursday. For bills received after these dates, the checks may not be processed until the next pay period, causing a two week delay in your receiving your check.

Your bill may be for any period of time. It does not have to start on a Monday or end on a Friday. Your bill may be for any period convenient for you to meet our billing dates listed above. Please note these are the dates the bill must be at UES. For example, a bill received on or before April 6 will be mailed out to you on April 10. A bill received on April 7 will not be mailed until the April 21 bills are processed on April 24.

APPENDIX 1.B

PARTICIPANT'S QUESTIONNAIRE & REPLY SUMMARY

1987 USAF/UES GRADUATE STUDENT SUMMER SUPPORT PROGRAM
EVALUATION QUESTIONNAIRE
(TO BE COMPLETED BY GRADUATE STUDENT PARTICIPANT)

Name_____Title_____

Dept. (at home)_____Home Institution_____

Summer Supervising Professor_____

Research Colleague(s)_____

Laboratory Address of Colleague(s)_____

Brief Title of Research Topic_____

A. TECHNICAL ASPECTS

1. Was the offer of research assignment within your field of competency and/or interest? YES_____NO_____.

2. Was the work challenging? YES_____NO_____. If no, what would have make it so?_____
_____

3. Were your relations with your Supervising Professor and research colleague satisfactory from a technical point of view? YES_____NO_____
If no, why?_____
_____

4. Suggestions for improvement of relationship(s)._____
_____
_____

5. Considering the circumstances of a summer program, were you afforded adequate facilities and support? YES_____NO_____. If no, what did you need and why was it not provided?_____
_____

6. Considering the calendar "window" of ten weeks being limited by varying college and university schedules, please comment on the program length. Did you accomplish: more than_____, less than_____, about what you expected_____?

7. Do you feel the Graduate Student appointment should continue to require affiliation with a Summer Research Faculty Member? YES_____ NO_____.

8. Were you asked to present seminars on your work and/or your basic expertise? YES_____NO_____. Please list number, dates, approximate attendance, length of seminars, title of presentations (ues reverse side if necessary).

9. Were you asked to participate in regular meetings in your laboratory? YES_____NO_____. If yes, approximately how often?_____
_____

10. Other comments concerning any "extra" activities._____
_____
_____

11. On a scale of A to D, how would you rate this program? (A high, D low)

Technically challenging	A	B	C	D
Future research opportunity	A	B	C	D
Professional association	A	B	C	D
Enhancement of my academic qualifications	A	B	C	D
Enhancement of my research qualifications	A	B	C	D
Overall value	A	B	C	D

B. ADMINISTRATIVE ASPECTS

1. How did you first hear of this program?_____
_____

2. What aspect of the program was the most decisive in causing you to apply?_____
_____

GRADUATE STUDENT QUESTIONNAIRE
(Page 3 of 3)

3. How do you rate the stipend level? Meager_____Adequate_____ Generous_____.

4. Please give information on housing: Did you reside in VOQ_____, apartment_____, other (specify)_____? Name and address of apartment complex and manager's name._____
_____

5. Would you encourage or discourage expansion of the Student Program? _____Why?_____
_____

6. Considering the many-faceted aspects of administration of a program of this magnitude, how do you rate the overall conduct of this program? Poor_____Fair_____Good_____Excellent_____. Please add any additional comments._____
_____

7. Please comment on what, in your opinion, are:

a. Strong points of the program:_____
_____
_____

b. Weak points of the program:_____
_____
_____

8. On balance, do you feel this has been a fruitful, worthwhile, constructive experience? YES_____NO_____.

9. Other remarks:_____
_____
_____
_____
_____
_____
_____

THANK YOU

QUESTIONNAIRE EVALUATION SUMMARY
(Graduate Student)

A. TECHNICAL ASPECTS

1. Assignment in field of competency and/or interest? Yes - 97
   No - 1

2. Work challenging? Yes - 94
   No - 4

   If no, why?

   Greater involvement in the research (i.e. development of new measures).

   The problem on which we worked was mostly routine statistical applications. It would have been more challenging if the problem had been oriented toward developing new techniques.

   More in-depth work on a single project.

   If I had done anything which required thought or effort.

3. Were your relations with colleagues satisfactory? Yes - 95
   No - 3

   If no, why?

   Reasoning behind research was not discussed, very limited contact with the supervising professor during the project.

   The research colleague was not there most of the time.

   I talked with the professor perhaps 10 times. These conversations consisted of "look this up" or "type this in the computer."

4. Suggestions for improvement of relationships?

   Bi-weekly (every 2 weeks) meetings (minimum) between graduate student and supervising professor to discuss ongoing "state-of-affairs" with regard to the project.

   Earlier selection of participant and identification of group focal point to allow prior communication of information and ideas.

   I was lucky. He is a visiting professor from Kent State who asked me to help him. I was briefed on project before I arrived.

   No control over the traveling that this particular branch of the laboratory has.

Perhaps mandate that conferences be held periodically, then direction of research can be monitored.

More time allotted for discussion of work.

More active criticism of my ideas and final report.

I would have preferred to work with more than 1 person in order to get more background and a better relationship with the laboratory as a whole.

Individual responsibilities could be better defined.

It would have been helpful if the research colleague would have contacted me personally, rather than only thorugh the professor, prior to the start of the work.

My supervising professor was not chosen to come here; it would have been better if he could have come.

Decoupling the research efforts of pre-summer faculty and the graduate students.

A meeting with the research colleagues prior to the start of the ten weeks would be helpful.

I would have appreciated a better preparation for my project. I did not know what I would work on until a week before I was to start.

I think the relationship is highly dependent upon the people involved. I am fortunate enough to have an excellent major professor in which there is no problem relating to.

More contact prior to beginning of research period.

Sometimes the professor and the research colleague would clash in ideas and personalities. The graduate student was stuck in the middle trying to satisfy both. Two bosses and one worker don't work very well. I suggest eliminating the need for the professor.

If I had known him beforehand or if someone had first checked to see if I was qualified.

5. Were you afforded adequate facilities? Yes - 84
No - 14

6. Accomplishment in ten weeks? More than expected - 14
Less than expected - 28
About what expected - 56

7. Do you feel the Graduate Student appointment should continue to require affiliation with a Summer Research Faculty Member?

Yes - 52
No - 46

8. Were you asked to present seminars? Yes - 32
No - 66

9. Were you asked to participate in meetings? Yes - 54
No - 44

10. Please give other comments on extra activities:

Attended lectures by visiting faculty, attended short course on natural languages - 1 week course.

Seminars attended on CLIP. Natural language course offered.

I was not informed about nor encouraged to attend seminars presented by my supervising professor or any of the other researchers at the facility.

We were invited to picnics, tours, promotions and retirements.

The travel made possibly by the Air Force, contributed significantly to this effort.

I think these extra activities were beneficial in that they provided additional interaction and information exchange with base personnel.

Had I more time, I would have been able to present a seminar, as my Branch Chief had hoped I would.

Was able to receive valuable insight into my own work, feedback from people here.

The buffets were nice but long winded.

Reading articles - it was helpful.

I assisted in a very minor capacity in a periosteum study by collecting residual specimens from my own study materials.

There should have been more of them.

I was included in short courses and seminars when available.

I would have liked to have spent some time with the radiation assessment team.

Tour of base facilities helped to orient us to our general work environment.

Being his only student this summer, he was able to devote his full attention to me. Consequently our working relationship was of great benefit to me.

I met with AFSFRP and AFOSR personnel, as well as officials from UES. This was helpful in providing contact with all parties involved in the summer program.

I gave a 15 minute presentation at this meeting on my work up to that point.

Visits to Lackland AFB, OTS and Randolph AFB were helpful.

We were treated as a part of the regular staff and were invited to attend luncheons, meetings, seminars and other staff activities.

Concerning non-work related activities, Colorado Springs provided many activities such as camping, hiking, etc. It is a beautiful place to live.

Reading of related articles from journals, etc.

Good opportunity to learn through observation of other ongoing research projects.

While working here on a ballistics range, I was able to see several "shots" of varying types of projectiles. This was very interesting.

I was an active field participant in AFGL/LWH's New England Quarry Blast Experiment (which lasted for about three weeks).

I attended a training seminar for a new gas chromatograph detector (NPD) nitrogen, phosphorus detector. I'm glad I was able to attend it, it was very interesting.

		A (HIGH)					D (LOW)	
11.	Technically challenging	A-	60	B- 31	C-	6	D-	1
	Future research opportunity	A-	70	B- 20	C-	4	D-	4
	Professional association	A-	64	B- 31	C-	2	D-	1
	Enhancement of my academic qualifications	A-	59	B- 26	C-	9	D-	4
	Enhancement of my research qualifications	A-	75	B- 17	C-	5	D-	1
	Overall value	A-	67	B- 30	C-		D-	1

B. ADMINISTRATIVE ASPECTS

1. How did you first hear about program?

Colleagues	-	73
Advertisement	-	5
Air Force	-	6
Direct Mail	-	14

2. Decisive aspect of application?

NOTE, MANY PUT MORE THAN ONE ANSWER

Area of possible future research funding	-	4
Good research opportunity	-	75
Opportunity to work with USAF	-	20
Location	-	6
Financial support	-	20
Lead to a Thesis	-	4

3. Stipend level?

Generous	-	26
Adequate	-	65
Meager	-	7

4. Housing information?

VOQ	-	7
Apartment	-	51
Other	-	40

5. Would you encourage or discourage expansion of the Student Program?

Encourage - 93
Discourage - 5

Encourage, why?

5 - It is a great experience and serves to broaden one's field of expertise while developing useful research projects.

This is a good opportunity for graduate students to be involved in ongoing research prior to (or as part of) their own research with respect to their degrees.

It is a worthwhile use of students who have time in the summer to contribute to a research effort.

The opportunity to establish long standing contacts both inside and outside the lab. Also a good chance to do operational research, see how government research is done. Develop stronger potential for landing a job later.

Offers chance to work in a non-academic research environment and be exposed to ideas of others working in related areas.

Because it would increase the level of youth awareness in science and research.

It has enormous possibilities for graduate student credit hours.

It is an excellent learning experience both for graduate students with no prior work experience and faculty who have been away from the non-academic environment for a period of time.

7 - It is an extremely rewarding experience.

For me, this summer provided a very unique learning opportunity and made me more aware of what research areas are available for funding.

I would particularly encourage that you advertise more directly to faculty members at home institutions, and stress the value in the experience we receive by doing this. It provides real working experience prior to degree status. Wonderful!

8 - Good exposure to "real" research activities.

This was a very challenging program that allowed me to work with some very talented people.

7 - Everyone involved - the Air Force, students, professors, and ultimately the associated universities - benefits from this research program.

I feel it is an excellent opportunity that enhances the educational experience with applied experience.

Gives the student a chance to experience a working environment outside of the classroom. Gave me more confidence in my abilities.

5 - More students could benefit from this experience.

The opportunity is fantastic, however, a larger program incures more red tape and lessens the quality.

Gives good exposure of Air Force research personnel and programs to graduate students.

It affords a graduate student the opportunity to both experience working in a technically challenging atmosphere and to work for the betterment of the country (National pride is very well preserved in this setting and important for a student).

It provides an opportunity to produce high quality research using Air Force laboratories.

Valuable work opportunity in laboratories not normally open to summer workers.

Although my own time here went slowly, I think it was pecular to my circumstances. In general the Air Force has very good research opportunities.

I would suggest that UES remain cautious about expanding the student program because there were times when I didn't know what to do and everyone who could have given me direction was busily engaged in something else.

It gave practical experience to the students and additional help for the USAF in research areas.

Graduate students tend to have tunnel vision and see only the academic side of what they learn. This opportunity provides an occasion to use what we have learned and to realize even more how much more there is yet to learn.

There is a great need for more positions like this (temporary summer work). I got 10 weeks of research experience and made a great deal of money.

Because it is a good exposure to working for the government, which most never consider.

It gives students the opportunity to apply their skills.

For the rest of my career I will be able to see how the military and the Air Force in particular, might benefit from new developments in psychology. I will therefore be in a better position to suggest applications to military needs.

The program enables students to conduct research in a setting outside the university, meet people, learn and use other equipment, find out more about one's area of interest.

It allows students not accustomed to a lab environment to develop research skills. This is good even if the person is not a researcher.

The opportunity to gain experience, money and affiliation with the Air Force bases (knowledge of government facilities) is priceless. The new high school program is an excellent idea for learning about making money, working with others; boosts ideas and encourages thinking for younger minds.

It was an excellent experience for me and it will undoubtedly help me with my research in the future.

In polymer science at least there are more opportunities for research than researchers.

It provides some legitimate research experience for graduate students who might otherwise obtain a degree without having worked in the "real world".

It gives the research-minded student a chance to explore and expand his/her talents.

Great opportunity - academically, professionally, personally and economically.

I found it to be very rewarding and enriching; the opportunity should be open to more students given the obvious benefits to both them and the Air Force.

Allows others the opportunity to enhance skills and become familiar with AFOSR programs.

Great opportunity to learn and gain experience in an area that is difficult to become involved in at most universities (aerospace science).

The program is very helpful in that it is a good opportunity to use your undergraduate skills.

There is a limited number of such programs and the value of the experience is tremendous.

It is a good program that provides invaluable experience and good research opportunities.

This gives graduate students an opportunity to do research while being paid.

It is a very good experience for any student.

I feel that it is very advantageous to have the opportunity to study and participate in research at other institutions. This affords one exposure to new ideas and techniques.

Simply because this program allows the student to become involved in beneficial research programs and provides the student with an excellent learning opportunity.

I think it is a great opportunity for a graduate student in Masters, but generally they are used as work horses not as idea producers. This is due in part to two bosses. PhD students are respected more for their ideas and that part should be expanded. The Master's student can gain experience but doesn't have the expertise to input great ideas.

Wonderful opportunity for allowing student to gain research experience and a great education experience as well as professional.

This program provides students with valuable experience that will benefit their graduate research as well as their future employers.

The experience of working with something new, and simply because it was a learning experience.

Excellent learning opportunity.

Commuted daily between Columbus and Dayton.

Gives students the opportunity to see what the Air Force is doing in terms of research.

Depending on criteria for selection of students, would encourage expansion. It's an excellent opportunity for motivated individuals.

It would afford opportunities to expand research knowledge.

Research of this type is a great opportunity for students.

Gives an opportunity for students to apply their educational background into practice.

It is a very good opportunity for students to gain research experience.

But only on the condition that some form of assistance is given the students as to where to go, what to do, whom to contact, and where to live once they arrive in Dayton. UES has been notably unhelpful in these areas.

It provides graduate students with an opportunity to become familiar with the procedures used with in the research community.

Discourage, why

The facilities are being utilized to their maximum now. No room for more experiments.

It's about the right size where interaction with others at the base is productive for all, expansion may allow too many students into the program and may make interaction less productive.

From my own experience, programs that become large are not managed well and students do not learn as much when there is a lack of one-on-one relationships with their peers and instructors.

A bigger group of students can be very disruptive to the Air Force Research Center day to day operation.

6. Program administration overall rating:

Excellent	-	45
Good	-	41
Fair	-	11
Poor	-	1

7a. Comments on the strong points of the program:

Willingness of all involved to help make everything work smoothly.

Chance to establish contacts for the future, chance to continue research uninterrupted by normal school routine, chance to earn some money over the summer.

The experience gained by the graduate student, exposure to different equipment and techniques, allowing graduate student and faculty member to work on common project.

Good research opportunity, good pay. Very helpful colleagues.

8 - Research and professional contact opportunities.

Opportunity to work on a research project, and the available facilities on the base.

Support of UES staff, opportunities to work with really strong researchers, chance to do some exciting work.

1) allowing one to set research goals and accomplishments; 2) a very experienced and empathic staff at UES who at all times seems tireless in helping out; 3) enhancing knowledge.

Terrific amount of knowledge to be gained - exposure to a professional research atmosphere.

Interaction with base personnel to enable me to understand their problem and concerns and allow them the opportunity to become familiar with me and my research efforts.

Professional associations, awareness of AFOSR programs.

Academic opportunity.

The program is good in that the researcher has a lot of freedom to do what he/she wishes in a particular field.

The experience, the compensation, and the opportunity to work with others in the field whose views may be unique and outside of those I am accustomed to at my home institution. As a personal experience, it is always very nice.

Allowed for supervised research, however we did do alot on our own and learned from it.

2 - The wide breadth of topics.

An excellent learning experience, and an outstanding opportunity in every way.

Applied research experience, facilities, pay scale.

A chance to provide exchange of ideas between Air Force and scientists outside Air Force.

Research exposure, meeting and working with good researchers, generous stipend.

"Laboratory" experience, pay scale.

Exposure of the student to working with some of the best scientists in their respective fields.

Availability of subjects, cooperative staff, opportunity to advance research interests.

My impression and attitude towards Air Force personnel and projects was very favorable. Prior to this visit, I had many more reservations toward participating in DoD funded research.

The opportunity to do research and to learn from the people who are at the leading edge.

Access to Air Force equipment; support of Air Force personnel; ability to focus on application of research.

Quality of the work experience offered, diversity of research/geographical areas available.

Good working conditions, excellent facilities, good people in the Air Force.

Excellent variety of research topics, good facilities, efficiency, good pay and working conditions.

Contact between university and USAF.

The opportunities to gain experience but also work on research.

Exposes students to research in "real world".

1)Experience gained by graduate students in a research environment. 2) excellent coordination between student's interest and placement. 3) academic and military interests become better known to each other.

Excellent experimental facilities with the personnel to utilize it to the fullest degree.

The research experience and the work environment, as well as exposure to government laboratories.

The chance to work in a "real" situation without the pressure of a permanent job.

Provides a productive means for graduate students to learn and participate in actual applied research.

Opportunity for immersion in practical needs of the Air Force. It's a golden opportunity for someone like myself who has spent years in academic settings.

The number of positions that appeared to be allowable.

The opportunity to conduct research, use modern equipment, learn various and new techniques, and the chance to associate with other researchers in a laboratory environment.

My continued exposure to a working research environment. Also, I worked with experienced researchers allowing me to learn a great deal.

The strongest point is that it gives students like myself a chance to research and get paid for it.

Ability to work with far-advanced minds, to give much input, and learn. All this can be spread from institution to institution. The possibility of publishing makes all persons involved, as well as the institution, well known.

The excellent opportunity it gives students for new research experiences and exposure to different people and the ways they research.

Summer Fellows are given much freedom to research what they want, and many areas of research are available.

The instructions provided by UES concerning the research effort and final report were very clear and helpful.

Technical work, professional associations, chance for future research opportunities.

The capacity to research numerous topics; meet professionals from all levels of the sciences; sharing common ideas.

Well coordinated; meets its goal of providing a challenging research experience.

Allows civilian personnel the chance to become more involved in DOD research. This may facilitate a better trust between the two.

Excellent research opportunity and a good base for possible future employment.

Travel support, variable research interests (not just in one subject) flexibility.

Good research opportunity, invaluable experience.

Money, length of appointment (10 weeks is not too short or long).

Exposure to research going on now and what could be studied in the future, experience, making contacts.

By its very nature it gives students a chance to do research away from the university for a change of pace.

4 - Exposure to new ideas and techniques.

Outstanding facilities; excellent working conditions; knowledgeable personnel; excellent opportunity to make contacts; excellent learning opportunity.

Ability to interact with professionals in the field and see how ideas are started and medified to produce a worthwhile product.

Meeting and working with research colleague because he gives a fresh approach to our experiment by taking it out of the biological realms and interpreting it from a physical point of view.

Participation in this program allowed the opportunity to do additional research that was unavailable at my university, specifically verification of my model with experimental data.

The opportunity to employ theory in real world situations is the program's best asset. Also, the program allows the civilian to appreciate the quality people in the USAF.

The experience and the knowledge gained.

Having the opportunity to work closely with experts in various fields.

I was encouraged to make contact with numerous researchers who were both in and out of field of research. This allowed me to gain insight into a number of diverse fields.

Its existence, the willingness of people to help the students.

It affords the graduate students with an opportunity to do high tech research in a very professional atmosphere.

Exposure to different research opportunities within the AF; exposure to skills and training of AF personnel, available facilities, etc.

Performing military related work; technical publishing; Air Force-University relations.

The UES personnel were wonderful and always more than helpful. The Air Force personnel were very competent and made this summer a great experience.

Be able to improve my backgrcund in the research area.

Given me a chance to know going on researches of the Air Force.

Good pay, the opportunity for further research under UES grants.

Provides an opportunity to practice and apply our knowledge in a "real world" context.

Give the student a chance to know practical research projects within the Air Force research program.

I think it is wonderful that you give students a small taste of working with big business and government thereby confirming their basically sound instinct that they should avoid such organizations whenever possible.

It gives one the opportunity to experience the ins and outs, first hand, of "real world" research.

7b. Comments on the weak points of the program:

9 - Only given 10 weeks to do the work.

Lack of structure as to expectations regarding participation of the graduate student in the supervising professor's research (i.e., whether there should be individual contributions or just a support capacity).

5 - Housing, initial directions are confusing.

Initiation to move; I received no materials on housing, base location, work location, etc. It would be easy to provide a map of base showing location of building where I was to report. There should also be an agenda provided for where to go and what you need to do on the first day (with a map).

1) not giving adequate information to appointees about Air Force requirements for example, I did not know that in order to obtain a pass for driving on base I needed to travel with my certificate of ownership and insurance, as a result I had to park my car outside base for the entire summer.

"Start-up/shut-down time" a significant period of time is spent in first dealing with administrative details, understanding work done to date and then documenting your efforts at completion.

This year I do find myself wishing I had more than 10 weeks. If I had my choice, I would continue through the summer! I really wish I had more time now.

Not getting supplies on time (from USAF).

Tax considerations and housing.

Negligible.

Students should be allowed to come down for a pre-summer visit to work out details of the assignment. Especially if the student is working on a different project than his/her supervising professor. This would allow for preparation for the research project.

Lack of detailed knowledge about the program ahead of time; little or no knowledge of this program at my school (department).

Lack of communication between UES and research supervising scientists.

Many of the USAF researchers are not aware of the UES program and the responsibilities and requirements deemed by the program on the summer fellow.

Should separate faculty and student programs.

Not enough feedback on peer review.

The aforementioned administrative problems; administrative body needs to have better contact with the laboratories and this has yet to be done.

If my professor had not been there I would have been lost. The students need to be more informed of what is going on and where physically on the base.

The extreme slowness with which things get done in the Air Force.

I was not placed exactly where I wanted to be.

At the beginning what bothered me was the uncertainty about the goals of my work on the base lab with respect to UES; to who am I responsible?

Communication prior to starting work. Lack of information in advance; payment system (pay when invoice is received rather than specific deadline which is too difficult to meet).

Decision to invite graduate students and university professor should be made at the same time.

The facilities/personnel are almost overloaded with work.

Administration.

It would have been better if I would have had specific research goals established before I entered the program. It took almost 4 weeks before I was working on a specific project.

Graduate students involvement becomes totally channeled through the supervising faculty's needs. To a great extent this faced me to serve as a research assistant to a professor rather than independently framing and researching questions of interest. This was to some extent discouraging.

Communication with individuals about their project i.e. what do I do if I want to talk to someone about their work if I can't contact them and they don't know me? How do they get to know me?

It is often difficult to conduct adequate experiments within the 10 week time period. This is especially true when dealing with the extensive protocols and waiting periods necessary when ordering and using laboratory animals.

I feel a 20 page limit on the final report is too short. I felt as if I could incorporate much more information but the paper was too limited.

I really didn't know exactly what to do about getting money and sending things in when I first started.

My only complaint is that I found the 20 page limit for the final report difficult to meet.

No weak point of the program itself; only that we (the U.S.) needs more programs such as these. This helps to build the country and make many people aware of what things we as Americans accomplish.

My contact with UES was mostly one-way, with me reporting every two weeks with almost no feedback from UES.

It was slightly annoying to prepare a report of effort every two weeks to receive compensation.

Notification should be earlier.

In this case a lack of some materials needed to conduct the experiment.

Need more social activities to get fellow program participants interacting - this is a definite weak point. There is a need for such interaction, especially during the first few days in a strange city.

Military research attempts to conform too much to the letter of research codes at time when there is time constraints, the rules may need to be flexible.

Program does not pay income tax and does not truly explain what will be required. I realized this in 1985.

Having to mail in our pay request; the stipend is difficult to live on if you have to pay for housing, especially in high income areas around Boston.

If anything comes up and shuts you down for a couple of weeks, it cuts a lot of your time since it is a ten week period.

It is not well publicized, and I only found out about it by word of mouth.

Administration - as I stated earlier no one in the Toxic Hazards Lab had any idea who was coming there and when. Also a lot of the graduate students were expected to put in more time than was allowed in the name of research. This is not fair to the garduate student. I put in 13-14 weeks worth of time there.

Due to the long distance between Trinity and Brooks AFB meeting between research colleagues could have been more frequent.

There should have been some form of preliminary correspondence between the research facility and the graduate students, as is provided the summer faculty.

It is a little short, as a person brings his/her data toward a publication, the publication should update the UES final report.

Initially it seemed that the organization of our group was lacking, but that worked itself out.

Goals for 10 weeks not clearly defined.

It would help if we could get a listing of apartments with the packet that contained our signed certification and budget.

Emphasize too much on student research but not enough on student gathering of knowledges.

Having to wait so long to receive payment. Lack at clarity on reporting requirements for individuals working as a team.

A 10 week research project significance is ranging from very little to none.

Virtually everything. In particular the Coordinator. What does this man do? Apparently as little as possible. His main purpose seems to be hand you a map and give you a list of names of people you should talk to instead of him.

Some lack of organization. Mostly on the part of the people in the lab that were responsible for assigning research projects.

When I asked to use the CDC because of past experience they should have done so, inefficient to learn too many systems.

8. Has this been a fruitful, worthwhile, constructive experience?
   Yes - 97
   No - 1

9. Other remarks:

Overall, a very worthwhile and interesting experience. It helped my research duties and I met many new colleagues. I feel this summer definitely helped me in my career goals.

Student should receive a map and a visual flowchart of the people and regulations.

Thank you for selecting me.

He was not so inspirational an EFP. Also, could a list of people assigned to the same city, with their duty phone numbers be send out? We don't get to meet each other soon enough otherwise (or make any kind of arrangements for moving, living, travel, etc).

I wish I had another opportunity to be in the program again. It was a great and fulfilling experience. Thank you for selecting me.

Maps, food and housing information, and group contact member should be sent as early in advance of starting date as possible. Car and individual passes and approval to use the library could be made available upon arrival. Participants could be met the first day and taken to their assignment or at the very least told how to get there. An information sheet similar to that which is sent to summer faculty concerning athletic facilities, etc. should also be sent to GSSSP participants. I question why the summer faculty expence allowance is larger than the graduate student daily expense allowance (i.e. housing and food expenses are similar).

I was surprised at the meeting UES held here on base when we were basically told that our goal this summer was not to perform constructive research, but to get to know people. I realize that the overall goal of bringing the Air Force into contact with researchers is more important and realistic for a 10 week period; however, before the meeting I had received no impressions concerning this goal at all.

Apartments with 3 month lease are HARD to find and EXPENSIVE. Suggestions: you may consider matching students up in apartments by helping them get together by mail and having a place reserved for them to rent in groups.

Thanks. I hope I'll be able to do this again. I've gained invaluable experience, and I feel too that I've been able to make a contribution to the project I've been working on. We began it last summer, and now I am here to help with data analysis. It's very exciting.

As pointed out, I feel that UES should provide more assistance in housing selection as there are a few of us here. I also feel that the tax considerations I will have to face are very gray.

The full-time involvement of one or more employees of the Air Force Laboratory would have substantially enhanced the productivity of this ten-week project. Overall, however, the program was quite satisfactory; prospects for future research and development of new technologies in cooperation with the Air Force are excellent.

I thoroughly enjoyed this experience, the people, the project and results obtained.

Need a follow on program for graduate students that would allow the research to continue with as little interruption as possible. The PhD's shouldn't have all the fun.

I recommend the expansion of this program strongly. It will give chances to get fresh ideas to Air Force which will strengthen its research and development effort.

This was my third summer in the program, and I must truly say it gets better and better every year. I want to again thank you for giving me another assignment, and I look forward to seeing you again next summer. Thanks UES.

More lead time is required. My project was delayed several weeks due to AF red tape on computer access. This needs to be dealt with sooner, so that this does not pose a threat to research; need to inform potential fellows much better. I learned of the program entirely my accident.

In my case, I would have preferred an eight week appointment. It seemed that the last two weeks dragged by and I needed a break from my research.

I would like to continue my association with the Air Force and the laboratory. This program offers the student a good opportunity to explore their interests on a professional level, judged by their peers and their superiors. This program has the potential to be excellent, but this can only happen via a strong and viable association between the business people and the laboratory people. This will help to cut some of the red-tape and struggle that in-coming students must face. This program must also be more open to qualified solitary graduate students and persons wishing to return to the labs for a second or third term (experience really helps).

I feel that the participants should have been introduced before the meeting on July 2. I met two of the others in the program and became good friends with them. I would have liked the chance to get to know the others. Overall, I would do it again and recommend it highly.

The experience was very rewarding.

I'd like to thank UES and Patrick AFB for the opportunity. I feel that I have learned a lot. But even more I have gained insight in computers and about the direction I wish to pursue in this field. Thank you.

I enjoyed working in the Materials Lab this summer. Everyone I met was nice and all were helpful. I can sum my experience up in one word - SUPER!

I would like to sincerely thank all the people and organizations involved in the GSSSP program. It has been a great and profitable experience for me.

I did not feel adequate support was provided for the graduate students; the amount of cash advances should be increased; UES should rent a house or building for the graduate students for the 10 week period.

One thing to which I found it had to adjust is the expectation that all work be done on base. I am used to an academic environment, where you are given an assignment and a due date, and what you do in between is your business, as long as you do the job. I think I could have done better work in a less restrictive atmosphere.

Thank you once again. I've had a beneficial experience working for UES at WPAFB.

I believe that UES representatives were disrespectful of researchers concerned with social or psychological topics when they visited the San Antonio area and spoke at Brooks AFB. This was discouraging. I view myself as a scientist who has studied a number of sciences, but is particularly interested in the social sciences. However, I also found the Human Resources Laboratory very supportive of my research interests, which was quite encouraging.

May this program last for years.

It would beneficial to have some money available to the researchers that they could use to buy necessary supplies for their experiments. It is not always possible for the home university or the Air Force to obtain the necessary supplies in the 10 week time period.

I greatly appreciate the opportunity to work and demonstrate my abilities. I would definitely be interested in future appointments.

I would like to say that the people I worked with at the lab were very supportive and helpful.

My summer research had little to do with my thesis research. Even so, the work was interesting and challenging.

Thanks for allowing me to return!

I encountered a time constraint problem in this program. I think that projects should be undertaken with a 10-week time limit in mind but it is often difficult to determine the length of time a certain project will require for its completion. When such situations arise, there should be some structured means of project continuation.

You should inform all persons whom will be driving on military bases that they should have their auto registration and proof of insurance before they depart from their homes. Any type of paperwork which is needed by the fellow, he/she should be made aware of this fact beforehand.

Program was just as helpful the second time around. The diversity that is available make return fellowships just as beneficial as the first.

There is a strong possibility for continued research here next summer. I would very much like to attend next year's program here.

I had a wonderful summer working at AFGL.

I would have liked to have had a longer stay, perhaps 12-13 weeks.

Time caught up to me real fast. Even after staying on a couple of extra weeks the amount of time seemed too short.

Due to the inflexibility of many graduate students' research commitments, they may not be able to participate in this program. I think it should be extended to allow college juniors to participate if properly qualified and associated with a faculty member. This may give them incentive to pursue research in graduate school.

This is a great program. The knowledge and experience gained through this work will provide me with job and research opportunities for many years to come. Thank you for a very rewarding experience.

A special fund should be set up for supply items. The Air Force ordering system generally takes 3 months to obtain items. The university the professors/students come from don't have the money for these items, nor should they pay for it. We had to do without several items this summer because we couldn't wait 3 months for them.

I feel that the Effort Focal Point assigned to each fellow should be the one working with the fellow and has affiliation with the Air Force. In this way, since the collaborator knows the fellow well, he or she can give a more accurate report on the fellow's work to both the fellow and UES.

I found the program rewarding and intellectually challenging. I've gained a better appreciation for the complexity of the work going on at the LMC. I made many new friends and acquaintances. It is my hope that the research I conducted will be of value to the USAF. The worst part of the program was its ending! I'll miss the friends I have made. Thank you for allowing me to be a part of the program.

I thoroughly enjoyed the work and the people with whom I worked. Everyone was both helpful and professional. It was an excellent opportunity to help conduct some of the procedures that had only been read about in the classroom. If given the opportunity, I shall apply next spring.

The effort focal point has to be more careful about information on housing and on providing information like maps of the place to give the summer employee an idea of where he or she is going to be for the summer.

Temporary housing would have been a great help, until more permanent housing can be arranged.

A very professional work atmosphere exists at the Air Force Weapons Lab. The people there went out of their way to support my work. I believe this summer fellowship position provided me with an excellent work experience.

It would be beneficial to have exact expectations clearly defined and reviewed for the purpose of meeting the time constraints.

Thank you for a wonderful summer.

Instead of asking the student to do a 10 week project, the program should emphasize on inviting him to evaluate and comment on various projects either from contractors or going on at the Research Center. This will be mutually beneficial to both the student and the Air Force; the student a chance for exposure and the Air Force an outside opinion.

The people in the lab did not get me started on a project until two weeks had passed. After that they changed what I was doing twice. By the time I was started on the project I finished with at least half of the ten week period. I would like to see the people in charge of assigning projects know what we are going to be doing before we arrive.

First off, improve your final questionnaire. There is too little room for comments and many of the questions are poorly worded and not pertinent. You also need to include questions about whether UES offers the necessary support and help that summer faculty and students need. In response to this unasked question, UES does not. I personally spent several days calling people, the end result being that I arrived in Dayton with no idea where I was suppose to go, with no one to meet me, no form of transportation, and no knowledge of where I was going to stay or how much it would cost. This is intolerable and should be corrected at once. UES should find one common local, perhaps make a deal with a nearby apartment complex, where all students and faculty could stay. Then UES should supply a bus which would transport the people back and forth from work. It could even be used to take people to the store and laundromat once a week. The cost for the rooms and bus could be deducted from the pay checks of the people involved. It would result in a much more convenient and happier living environment, as greater sense of closeness among the summer faculty and students, and, I believe, in a far greater productivity from those involved. Everyone I have talked to has not only agreed with this, they have thought of it long before the conversation has come up. In fact, if you had taken time to ask, I'm sure that you would have found that all of the summer faculty and students support this idea 100%.

APPENDIX 1.C

LABORATORY REPRESENTATIVE'S QUESTIONNAIRE & REPLY SUMMARY

1987 USAF/UES SUMMER FACULTY RESEARCH PROGRAM

EVALUATION QUESTIONNAIRE

(TO BE COMPLETED BY LABORATORY REPRESENTATIVE)

Laboratory/Center _____

Name _____

1. How do you rate the correspondence, verbal and telephone communication, and other aspects concerning program administration?

Excellent____ Good____ Average____ Poor____ How could it be improved?

_____

_____

2. The participant selection process is two-fold: academic and technical. Did you have sufficient time to conduct an evaluation of applications?

YES____ NO____

Comments: _____

_____

_____

3. Was the number of faculty researchers assigned to your organization satisfactory?

YES____NO____. If not, how many would be desired?_____ How do you determine this number?

_____

_____

4. Please rate the expense-paid pre-program visit:

Essential____ Convenient____ Not worth the expense____

5. In your opinion is the ten-week time period an optimum length of time to develop a viable working relationship among the faculty researchers, students, laboratory/center personnel and programs? YES____ NO____. If no, what length would it be.

_____

_____

Other comments:

_____

_____

_____

_____

6. Did your laboratory/center establish a seminar program, or other means, to "tap" the faculty associate's academic knowledge other than his research assignment? YES____NO____.

If yes, give description and evaluation.

_____

_____

_____

LABORATORY REPRESENTATIVE QUESTIONNAIRE (Page 3 of 5)

7. Did the laboratory/center conduct a general briefing, tour, and/or other formal means of welcome and introduction for the associate assigned to your organization?

YES____ NO____.

8. Did you have a formal exit exercise for each associate such as a final technical briefing presented to the organization management, a private interview, or other?

YES____ NO____.

9. In your opinion, what was the overall quality of this year's participants as measured by attitude, technical competence, work habits, production and meaningful research accomplishment?

(Note: These answers will be held confidential.)

List Names	Superior	Excellent	Average	Poor

10. Do you believe the Graduate Student Program enhances the Summer Research Program?

YES____ NO____

LABORATORY REPRESENTATIVE QUESTIONNAIRE (Page 4 of 5)

11. Was a student assigned under the Graduate Student Summer Support Program to your laboratory this summer? YES____ NO____. If so, was their participation productive? YES____ NO____.

12. Please furnish any recommendations you may have on improving the Graduate Student segment of the program.

_____

_____

_____

_____

_____

13. Site visits were made by Program Director and/or Administrator and the AFOSR representative. Do you feel these visits are beneficial to the program participants and Laboratory in understanding the management of the program? YES____ NO____. Do you feel these visits should be done again next year. YES____ NO____.

14. UES has a coordinator assigned at your base to assist the Summer Faculty participants in the administration of the program. Did you find this beneficial to the program. YES____ NO____. Are there any problem areas coordinators should administrator in future years?

_____

_____

_____

LABORATORY REPRESENTATIVE QUESTIONNAIRE (Page 5 of 5)

15. Please furnish any other comments or suggestion to improve the program in future years.

_____

_____

_____

_____

THANK YOU

1987 USAF/UES SUMMER FACULTY RESEARCH PROGRAM
EVALUATION QUESTIONNAIRE
LABORATORY REPRESENTATIVE

1. How do you rate the correspondence, verbal and telephone communication, and other aspects concerning program administration?

Excellent - 8
Good - 13
Average - 2
Poor -
No Response -

How could it be improved?

The cooperation and "can do" attitude at UES are outstanding.

Being new, didn't understand that if a Summer Faculty person wanted a fellow - it was automatic; had many unexpected people - some without resumes. Except for last minute cooperation by UES about loss fellows we wanted for ones "forced" on us by S.F. choice.

Poor communication. No status received after recommendations are submitted to UES, no information on projected start dates, not informed of the information given to the accepted applicants which explained the functions or gave the program manager responsible duties, poor copies of applications.

Could be improved by more frequent communication regarding plans, status, changes, other happenings in the program.

Some early-on problems were cleared up.

2. Did you have sufficient time to conduct an evaluation of applications?

Yes - 20
No - 3

Comments:

We had forced the system a little, but considering UES's restraints, we were able to get it done.

You never have enough time! Sometimes the specific activity to be completed hits at the same time "the boss" wants something. You know who suffers.

However, earlier notification would be helpful.

As usual - would always like an additional 2 weeks and would like to have graduate resumes arrive at the same time to make reviews more expedient.

More time would have been valuable to allow us to call and interview applicants.

3. Was the number of faculty researchers assigned to your organization satisfactory?

Yes - 17
No - 6

If no, how many would be desired?

2 or 3.

10.

14.

13. Interest in the SFRP within the laboratory.

7.

4. Please rate the expense-paid pre-program visit:

Essential	- 18
Convenient	- 4
Not worth the expense	- 1

5. In your opinion is the ten week time period an optimum length of time to develop a viable working relationship among the faculty researchers, students, laboratory/center personnel and programs?

Yes - 17
No - 5
N/A - 1

Other comments:

Consideration of all restraints leads one to conclude that 10 weeks is a good choice.

Ten weeks is probably a good compromise. However, from the laboratory perspective, ten weeks is absolutely a minimum time period to effectively accomplish a meaningful research effort.

Twelve months would improve the situation for experimental vs. theoretical efforts. Assuming that the researcher receives a mini-grant follow on, it is sufficient.

This question should be directed to AAMRL sponsors who evaluate each SFRP and GSSSP appointee.

Twelve weeks would be better. That would allow for ten full weeks of research. It takes a week or two to get organized and under way and to wrap up activities at the end of the brief research program.

Depends somewhat on the project, but 10 weeks is minimum. 12-14 weeks would be better. It is very time consuming for staff members to manage the preparation necessary to support a 10 week project. This detracts from their primary duties and ultimately lowers productivity.

Up to a maximum of 16 weeks - but variable based on work to be done.

10-12 weeks.

The work efforts were adjusted to fit the time schedule. In general two to four more weeks would help.

The ability to split the visit would be good for some faculty. They need to be at school 1 or 2 times during the 10 weeks, but cannot accomodate it currently.

6. Did your laboratory/center establish a seminar program, or other means, to "tap" the faculty associate's academic knowledge other than his research assignment?

Yes - 10
No - 13

If yes, give description and evaluation.

Some divisions require the SFRP associate to present a seminar in addition to a presentation of the results of the assignment.

A number of professors presented seminars to groups of RADC engineers.

Such activities were limited to individual branches and divisions or groups with whom the associate worked.

Discussion among Division Chiefs, Deputy Director, Director and participant.

Weekly brown bag seminar. Though it worked well last year, it never fully jelled this year - personalities, I think. Will try again next year.

Found seminars in particular of interest.

We asked our researchers to present their findings to both our staff and the Defense Equal Opportunity Council's military working group in Washington, D.C.

A number of the faculty gave lectures in their area of expertise. These were outstanding contributions.

Seminars were very well received by laboratory personnel.

The professors generally wanted to spend their time working; not preparing seminars.. They did attend our technical presentations and most, if not all, gave a final seminar.

7. Did the laboratory/center conduct a general briefing, tour, and/or other formal means of welcome and introduction for the associate assigned to your organization?
   Yes - 18
   No - 5

8. Did you have a formal exit exercise for each associate such as a final technical briefing presented to the organization management, a private interview, or other?
   Yes - 16
   No - 7

9. In your opinion, what was the overall quality of this year's participants as measured by attitude, technical competence, work habits, production and meaningful research accomplishment?

List Names	Superior	Excellent	Average	Poor
	46	47	10	

10. Do you believe the Graduate Student Program enhances the Summer Research Program?
    Yes - 20
    No - 1
    N/A - 2

11. Was a student assigned under the Graduate Student Summer Support Program to your laboratory this summer?
    Yes - 20
    No - 2
    N/A - 1

    If so, was their participation productive?
    Yes - 18
    No -

12. Please furnish any recommendations you may have on improving the Graduate Student segment of the program.

It worked quite well for us.

Seems to move along nicely and produce results. If the program did not help, we would hear about the fact from our personnel.

Will not accept graduate student unless they are assigned to work under the guidance of a SFRP participant.

Can't immediately visualize mechanics, but someway of knowing if you select Dr. X you'll also get Mr. A and B -- for planning purposes only - like physical space. As it was, had two separate exercises with the GSSSP people being dictated in the end by SF selections.

Graduate students should be required to have had a few graduate courses to improve quality, however, in general the students are very good and some method of keeping them under a co-op or other type program should be found.

We could use a few more students. We had three this year, but could easily have used six or seven.

It is great -- add Research Initiation Grant opportunity for graduate students who come on their own.

Increased emphasis on advertising of the program to increase applicants.

Maintain a strong tie between graduate students and faculty.

If a faculty member is anticipating having a graduate student also apply, it would be helpful to know that at the time of the application of the faculty; graduate students should either plan to work with their faculty member or be advanced enough to have a project of their own in mind.

Would not recommend a change at this time. The assigning of graduate students with or without a faculty member is effective.

If the faculty member recommended a student, he/she was selected. The selection should be up to the laboratory.

So far the graduate students we have had were not with their professor. This meant someone else had to advise them. We would benefit from selecting professor and student at the same time. This information is not available to allow at our concurrent selections.

13. Site visits were made by Program Director and/or Administrator and the AFOSR representative. Do you feel these visits are beneficial to the program participants and Laboratory in understanding the management of the program?

Yes - 14
No - 5
N/A - 4

Do you feel these visits should be done again next year?

Yes - 15
No - 6

14. UES has a coordinator assigned at your base to assist the Summer Faculty participants in the administration of the program. Did you find this beneficial to the program?

Yes - 12
No - 2
N/A - 9

Are there any problem areas coordinators should administrator in future years?

Civilian personnel has a "newcomers" package which could be provided to each of the participants prior to their arrival on base.

Wright-Patterson Coordinator did an excellent job. It would be difficult to run the programs without him.

Only talked with him on two occasions. Was unaware of what his role was.

15. Please furnish any other comments or suggestion to improve the program in future years.

AEDC opinion of the program is that it is a highly beneficial program and well managed. Continue it. This was the general summary presented to the Commander and his staff at AEDC. Thanks for all the good fast help on everything. I really did appreciate it.

The program is being administered in an excellent manner.

I would hope that your deadlines have a built-in cushion for you. Meeting all the imposed deadlines for you compromises the accomplishment of other work regarding Lab exercises, and slippage is going to occur.

We get a lot of work done in the summer. The SFRP has been highly productive for us.

Suggest preparing a calendar or schedule of events for the year to be given to the lab focal points to aid in or improving program management. The schedule could be the projected dates for research interest updates-to-submission of final reports.

It is a good program. We hope it continues.

Overall is ok. Just do what is necessary to keep it alive. I am especially pleased with the ability to attract graduate students, even those who do not come with a faculty sponsor. This gives our laboratory a chance to interact with some otherwise unknown potential federal employees. DO NOT back down on this valuable feature of the program.

Excellent program. The only way it could be improved is to broaden the opportunities for research in social and behavioral sciences and allow more than 10 weeks for some projects.

We have a hard time supporting alot of people during the summer. It would be extremely helpful and more beneficial to encourage off-season participation. This would work for schools on a quarter or tri-mester schedule. Also, the objective of the program should be more clearly defined for both the applicants and the laboratories. We have found it best to have people work their project into an already on-going program, rather than expect to start and finish a totally new project from scratch in 10 weeks. However, many applicants seem to think that they should do their own thing. This is very hard for us to support.

Faculty/Grad Student High School programs working fine.

Continue the good work.

There appears to be a slight problem with record keeping at UES. A number of forms have evidently been lost in the shuffle.

Program is on the right track. AFAL scientists are continuing to gain interest in the program.

APPENDIX II

A. Program Statistics

B. List of 1987 Participants

C. Participant Laboratory Assignments

APPENDIX II A

Summer Faculty Research Program

Sponsored by
Air Force Office of Scientific Research

Conducted by
Universal Energy Systems, Inc.

Program Statistics

Program Statistics

1. Applications Received (by Laboratory)

Organization		1st Choice
AAMRL	(WPAFB)	27
APL	(WPAFB)	7
AD	(Eglin)	4
AEDC	(Arnold)	7
AL	(WPAFB)	5
DEOMI	(Patrick)	4
ESMC	(Patrick)	2
ESD	(Hanscom)	0
ESC	(Tyndall)	9
FDL	(WPAFB)	12
FJSRL	(USAFA)	3
GL	(Hanscom)	3
HRL/LR	(WPAFB)	2
HRL/OT	(Williams)	2
HRL/MO	(Brooks)	2
HRL/ID	(Brooks)	1
LC	(WPAFB)	2
LMC	(Gunter)	1
ML	(WPAFB)	17
OEHL	(Brooks)	7
RPL	(Edwards)	3
RADC	(Griffiss)	9
SAM	(Brooks)	36
WL	(Kirtland)	13
	Totals	178

2. Number of Participants - 101

Number with Bachelors Degree - 62
Number with Masters Degree - 39

Program Statistics
Continued

3. Number of Participants at Each Laboratory

Organization

AAMRL	(WPAFB)	- 13	GL	(Hanscom)	- 3
APL	(WPAFB)	- 5	HRL/LR	(WPAFB)	- 1
AD	(Eglin)	- 4	HRL/OT	(Williams)	- 1
AEDC	(Arnold)	- 5	HRL/MO	(Brooks)	- 2
AL	(WPAFB)	- 4	HRL/ID	(Brooks)	- 0
DEO	(Patrick)	- 1	LMC	(Gunter)	- 1
ESC	(Tyndall)	- 5	ML	(WPAFB)	- 12
ESD	(Hanscom)	- 0	OEHL	(Brooks)	- 6
ESMC	(Patrick)	- 1	RPL	(Edwards	- 2
FDL	(WPAFB)	- 6	RADC	(Griffiss)	- 5
FJSRL	(USAFA)	- 2	SAM	(Brooks)	- 14
		-	WL	(Kirtland)	- 8
				Total	101

4. Discipline Represented -

Aerospace Engineering	- 5	Health Care	- 1
Atmospheric Science	- 1	History	- 1
Biochemistry	- 2	Human Development	- 1
Biology	- 8	Human Factors Eng.	- 1
Biomedical Engineering	- 2	Industrial Engineering	- 1
Chemical Engineering	- 3	Industrial Psychology	- 1
Chemistry	- 5	Linguistics	- 1
Civil Engineering	- 4	Mathematics	- 5
Computer Science	- 10	Mechanical Engineering	- 13
Electrical Engineering	- 9	Natural Science	- 1
Environmental Pollut.	- 1	Nuclear Engineering	- 1
Environmental Design	- 1	Physical Anthropology	- 1
Excercise Physiology	- 1	Physics	- 9
Geological Engineering	- 2	Psychology	- 9
		Statistics	- 1

5. Colleges and Universities Represented - Total

Akron, University of	- 1	Montclair State College	- 1
Alabama, University of	- 3	Nebraska, University of	- 1
Alaska, University of	- 1	New Mexico, University of	- 3
Arizona State	- 2	New York University	- 1
Auburn University	- 3	New York, State Univ. of	- 1
Brown University	- 1	Northwestern University	- 1
Calif. St., Santa Cruz Univ.	- 1	Notre Dame, University of	- 1
Cincinnati, University of	- 3	Ohio State University	- 5
Colorado, University of	- 2	Ohio University	- 1
Cornell University	- 1	Oregon Graduate Center	- 1
Dayton, University of	- 4	Oregon State University	- 1
Eastern Illinois, University	- 1	Pennsylvania, University of	- 1
Eastern Washington University	- 1	Prairie View A&M University	- 1
Florida A&M University	- 1	Puerto Rico, Mayaguez Univ.	- 1
Florida, University of	- 1	Rochester, University of	- 1
Georgia Inst. of Technology	- 1	San Diego State University	- 1
Houston, University of	- 2	South Florida, University of	- 2
Illinois, University of	- 3	Southern Illinois University	- 2
Indiana Univ. of Pennsylvania	- 1	Tennessee Space Institute	- 1
Iowa, University of	- 2	Texas A&M University	- 2
John Hopkins University	- 2	Texas Southern University	- 1
Kansas State University	- 1	Texas-Austin, University of	- 1
Kent State University	- 2	Trinity University	- 1
Louisiana State University	- 3	Tulane University	- 1
Meharry Medical College	- 7	Vanderbilt University	- 1
Middle Tennessee State Univ.	- 1	Washington State University	- 2
Mississippi State University	- 1	Western Michigan University	- 1
Mississippi, University of	- 2	Wright State University	- 6
Missouri-Rolla, University of	- 3	Wyoming, University of	- 1

Total 101

Program Statistics
Continued

6. States Represented -

Alabama	- 6
Alaska	- 1
Arizona	- 1
California	- 2
Colorado	- 2
Florida	- 4
Georgia	- 1
Illinois	- 8
Indiana	- 1
Iowa	- 1
Kansas	- 1
Kentucky	- 1
Louisiana	- 4
Maryland	- 2
Michigan	- 2
Missouri	- 4
Mississippi	- 3
Nebraska	- 1
New Jersey	- 2
New Mexico	- 2
New York	- 3
Ohio	- 18
Oregon	- 2
Pennsylvania	- 4
Puerto Rico	- 1
South Dakota	- 1
Tennessee	- 9
Texas	- 10
Washington	- 3
Wyoming	- 1

7. Age of Participants -

Average - 27

APPENDIX II B

LIST OF PARTICIPANTS

LIST OF 1987 GRADUATE STUDENT PARTICIPANTS

NAME/ADDRESS	DEGREE, SPECIALTY, LABORATORY ASSIGNED
Antoinne C. Able Meharry Medical College School of Medicine Nashville TN 37208 (615) 361-5303	Degree: M.S., Biology, 1982 Specialty: Biology Assigned: SAM
Mark T. Anater Dept. of Polymer Science University of Akron Akron, OH 44311 (216) 434-1844	Degree: B.S., Chemistry, 1986 Specialty: Chemistry Assigned: ML
Petar Arsenovic Dept. of Materials Science John Hopkins University Baltimore, MD 21218 (301) 338-8970	Degree: M.S., Mechanical & Aerospace Sciences, 1985 Specialty: Chemistry Assigned: ML
Catherine Aubertin Dept. of Educational Psychology Southern Illinois University Carbondale, IL 62901 (618) 536-7763	Degree: M.S., *Environmental* Design 1982 Specialty: Environmental Design Assigned: HRL/MO
David R. Bosch Dept. of Mechanical/Aero. Eng. Arizona State University Tempe, AZ 85287 (602) 965-3291	Degree: B.S., Mechanical Engineering 1987 Specialty: Mechanical Engineering Assigned: APL
Steven W. Bucey Dept. of Physics Kent State University Kent, OH 44240 (216) 673-1255	Degree: M.S., Physics, 1986 Specialty: Mechanical Engineering Assigned: ML
John N. Bullock Dept. of Electrical Engineering Univ. of Missouri-Rolla Rolla, MO 65401 (314) 341-3123	Degree: B.S., Electrical Eng., 1987 Specialty: Electrical Engineering Assigned: APL

Robyn A. Butcher
Wright State University
Dept. of Biology
Dayton, OH 45435
(513) 886-1784

Degree: B.S., Biology, 1987
Specialty: Biology
Assigned: AAMRL

Kevin P. Cahill
Dept. of Electrical/Comp. Eng.
University of Cincinnati
Cincinnati, OH 45221
(513) 475-4461

Degree: B.S., Physics, 1987
Specialty: Physics
Assigned: AL

David C. Carpenter
Dept. of Nuclear Engineering
Texas A&M University
College Station, TX 77843
(409) 845-4161

Degree: M.S., Nuclear Eng., 1986
Specialty: Nuclear Engineering
Assigned: WL

Andrew D. Carson
Dept. of Educational Psychology
University of Texas-Austin
Austin, TX 78712-1296
(512) 471-4155

Degree: M.S., Human Development 1986
Specialty: Nuclear Engineering
Assigned: HRL/MO

Kyunam Choi
Dept. of Physics and Astronomy
University of New Mexico
Albuquerque, NM 87131
(505) 277-6317

Degree: M.S., Physics, 1984
Specialty: Physics
Assigned: WL

Otis Cosby Jr.
Meharry Medical College
School of Medicine
Nashville, TN 37208
(615) 321-6413

Degree: B.S., Natural Science, 1983
Specialty: Natural Science
Assigned: SAM

Richard B. Davidson
Dept. of Mathematics
University of Alabama
Birmingham, AL 35205
(215) 934-3720

Degree: B.S., Math & Computer Sci. 1987
Specialty: Mathematics
Assigned: ML

Tamara Della-Rodolfa
Dept. of Psychology
Indiana Univ. of Pennsylvania
Indiana, PA 15705
(412) 357-2426

Degree: B.S., Psychology, 1986
Specialty: Psychology
Assigned: AAMRL

Steve Dixon
Dept. of Chemistry
Wright State University
Dayton, OH 45435
(513) 873-2855

Degree: B.S., Chemistry, 1986
Specialty: Chemistry
Assigned: AAMRL

James Drakes
Dept. of Physics
Tennessee Space Institute
Tullanoma, TN 37388
(615) 455-0631

Degree: B.S., Physics, 1987
Specialty: Physics
Assigned: AEDC

Susan M. Dumbacher
Dept. of Aerospace Eng.
University of Cincinnati
Cincinnati, OH 45219
(513) 621-0095

Degree: B.S., Aerospace Engr., 1986
Specialty: Aerospace Engineering
Assigned: FDL

Donna N. Edwards
School of Pharmacy
Florida A&M University
Tallahassee, FL 32307
(904) 599-3302

Degree: M.S., Chemistry, 1982
Specialty: Chemistry
Assigned: OEHL

Kathy S. Enlow
Dept. of Healty, Physical Ed.
University of Alabama
Tuscaloosa, AL 35487-1967
(205) 348-6075

Degree: B.S., Community Health Care 1985
Specialty: Health Care
Assigned: SAM

Thomas Enneking
Dept. of Civil Engineering
University of Notre Dame
Notre Dame, IN 46556
(219) 283-1497

Degree: M.S., Civil Eng., 1978
Specialty: Civil Engineering
Assigned: FDL

Gloria Fisher
Dept. of Psychology
University of Mississippi
University, MS 38677
(601) 232-5077

Degree: M.S., Industrial/Org. Psych. 1987
Specialty: Industrial Psychology
Assigned: DEOMI

Inge Ford-Belgrave
Texas Southern University
University, MS 38677
(601) 232-5077

Degree: B.S., Biology, 1984
Specialty: Environmental Pollutants
Assigned: OEHL

Beverley Gable
Dept. of Psychology
Ohio University
Lancaster, OH 43130
(614) 654-0602

Degree: M.S., Psychology, 1987
Specialty: Psychology
Assigned: AAMRL

Deborah Gagnon
Dept. of Psychology
State University of New York
Amherst, NY 14260
(716) 689-7553

Degree: B.S., Psychology, 1987
Specialty: Psychology
Assigned: AAMRL

Edward Gellenbeck
Dept. of Computer Science
Oregon State University
Corvallis, OR 97330
(503) 752-1977

Degree: M.S., Computer Science, 1985
Specialty: Computer Science
Assigned: SAM

James A. Gerald
Dept. of Electrical Eng.
University of Mississippi
University, MS 38677
(601) 232-3752

Degree: B.S., Electrical Engr., 1987
Specialty: Electrical Engineering
Assigned: WL

Maurice Gilbert
Dept. of Medicine
Meharry Medical College
Nashville, TN 37208
(615) 327-6111

Degree: M.S., Biomedical Sci., 1983
Specialty: Biomedical Sciences
Assigned: SAM

Jeffrey Girard
Dept. of Mechanical Eng.
Washington State University
Pullamn WA 99164
(509) 335-8654

Degree: M.S., Mechanical Engr., 1982
Specialty: Mechanical Engineering
Assigned: ESC

Beverly Girten
Dept. of Exercise Physiology
Ohio State University
Columbus, OH 43210
(614) 292-1223

Degree: M.S., Exercise Physiology 1983
Specialty: Exercise Physiology
Assigned: AAMRL

Laura Giusti
Dept. of Psychology
San Diego State University
San Diego, CA 92182
(412) 833-3912

Degree: B.S., Psychology, 1986
Specialty: Psychology
Assigned: AAMRL

Nadia Greenridge
Dept. of Anthropology
New York University
New York City, NY 07631
(212) 598-3258

Degree: M.S., Anthropology, 1984
Specialty: Anthropology
Assigned: AAMRL

Thomas Harkins
Dept. of Mechanical Eng.
Louisiana State University
Baton Rouge, LA 70808
(505) 766-3671

Degree: B.S., Mech. Engr., 1986
Specialty: Mechanical Engineering
Assigned: AD

Deborah Hollenbach
Dept. of Biology
University of Dayton
Dayton, OH 45432
(513) 259-2135

Degree: B.S., Biology, 1986
Specialty: Biology
Assigned: AAMRL

Adrienne Hollis
Dept. of Biomedical Sciences
Meharry Medical College
Nashville, TN 37208
(615) 327-6221

Degree: B.S., Biology, 1986
Specialty: Biology
Assigned: SAM

Stephen Huyer
Dept. of Aerospace Engineering
University of Colorado
Boulder, CO 80309
(303) 444-63-68

Degree: B.S., Aerospace Engr., 1986
Specialty: Aerospace Engineering
Assigned: FJSRL

David James
Dept. of Math
Eastern Illinois University
Charleston, IL 61920
(217) 581-2028

Degree: B.S., Computer Sci., 1985
Specialty: Computer Science
Assigned: AEDC

George James, III
Dept. of Aerospace Eng.
Texas A&M University
College Station, TX 77843-3141
(409) 845-3947

Degree: M.S., Aerospace Engr., 1986
Specialty: Aerospace Engineering
Assigned: RPL

Stephen R. Jenei
Dept. of Biology
University of Dayton
Dayton, OH 45469-0001
(513) 229-2135

Degree: B.S., Biology, 1986
Specialty: Biology
Assigned: AAMRL

Kenneth Jenks
Dept. of Aero/Astronautical Eng.
University of Illinois
Urbana, IL 61801
(217) 244-0743

Degree: B.S., Computer Sci., 1985
Specialty: Computer Science
Assigned: WL

Michele Johnson
School of Electrical Engr.
Cornell University
Ithaca, NY 14853
(607) 255-4304

Degree: B.S., Electr. Eng., 1984
Specialty: Electrical Engineering
Assigned: RADC

Scharine Kirshoff
Dept. of Geology
University of Alaska
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(907) 474-7274

Degree: M.S., Geology, 1986
Specialty: Geology
Assigned: AFGL

Gary Lake
Dept. of Industrial Eng.
University of Houston
Houston, TX 77035
(713) 749-2538

Degree: M.S., Industrial Engr., 1985
Specialty: Industrial Engineering
Assigned: OEHL

David Landis
Dept. of Civil Engineering
Auburn University
Auburn, AL 36849
(205) 826-4320

Degree: B.S., Civil Eng., 1986
Specialty: Civil Engineering
Assigned: ESC

Sharon Landis
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Auburn University
Auburn, AL 36849
(205) 826-4330

Degree: B.S., Computer Engr., 1986
Specialty: Computer Engineering
Assigned: ESC

Craig Langenfeld
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Degree: B.S., Mechanical Engr., 1986
Specialty: Mechanical Engineering
Assigned: APL

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Louisiana State University
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Degree: B.S., Mechanical Engr., 1986
Specialty: Mechanical Engineering
Assigned: AD

Bruce Liby
Dept. of Physics/Astronomy
University of New Mexico
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(505) 277-2616

Degree: M.S., Physics, 1984
Specialty: Physics
Assigned: WL

A. Jeannine Lincoln
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Wright State University
Dayton, OH 45435
(513) 873-2504

Degree: B.S., Biochemistry, 1987
Specialty: Biochemistry
Assigned: AAMRL

Yolanda Malone
School of Medicine
Meharry Medical College
Nashville, TN 37208
(615) 321-0939

Degree: B.S., Chemistry, 1985
Specialty: Chemistry
Assigned: SAM

Randal Mandock
Dept. of Mechanical Eng.
Georgia Institute of Tech.
Atlanta, GA 30332
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Degree: M.S., Atmospheric Sci., 1986
Specialty: Atmospheric Sciences
Assigned: OEHL

James W. Mattern
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Beaverton, OR 97005
(503) 690-1130

Degree: B.S., Computer Engr., 1986
Specialty: Computer Engineering
Assigned: AD

Matthew McBeth
Dept. of Elect./Biomedical Eng.
Vanderbilt University
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Degree: B.S., Computer Sci., 1986
Specialty: Computer Science
Assigned: AEDC

Jennifer B. McGovern
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University of Florida
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Degree: M.S., Psychology, 1987
Specialty: Psychology
Assigned: SAM

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Brown University
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Degree: B.S., Biology, 1987
Specialty: Biology
Assigned: OEHL

Otto M. Melko
Dept. of Mathematics
University of California
Santa Cruz, CA 95064
(408) 429-2085

Degree: M.S., Math, 1982
Specialty: Mathematics
Assigned: AD

Ethan S. Merrill
Dept. of Engineering
University of Mississippi
Greenville, MS 38701
(904) 283-2942

Degree: B.S., Civil Engr.
Specialty: Civil Engineering
Assigned: ESC

Veronica Minsky
Dept. of Computer Science
Middle Tennessee State Univ.
Murfreesboro, TN 37217
(615) 898-2669

Degree: B.S., Linquistics, 1978
Specialty: Linquistics
Assigned: AEDC

Frank W. Moore
Dept. of Computer Sci./Eng.
Wright State University
Dayton, OH 45435
(513) 873-3515

Degree: B.S., Computer Engr., 1986
Specialty: Computer Engineering
Assigned: AL

Stephen Morgan
Dept. of Psychology
Montclair State College
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(201) 893-4000

Degree: B.S., Psychology, 1984
Specialty: Psychology
Assigned: HRL/LR

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Biology Department
University of Dayton
Physiology Laboratory
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(513) 229-2135

Degree: B.S., Biology, 1985
Specialty: Physiology
Assigned: AAMRL

Conrad Murray
School of Medicine
Meharry Medical College
Nashville, TN 37208
(615) 321-5837

Degree: M.S., Biochemistry, 1986
Specialty: Biochemsitry
Assigned: SAM

Steven Naber
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Degree: M.S., Statistics, 1984
Specialty: Statistics
Assigned: OEHL

Jerome Nadel
Dept. of Psychology
University of Kansas
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Degree: B.S., Psychology, 1980
Specialty: Psychology
Assigned: HRL/OT

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Degree: M.S., Psychology, 1984
Specialty: Psychology
Assigned: SAM

Mark Neumeier
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Wright State University
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(513) 873-2476

Degree: M.S., Psychology, 1984
Specialty: Psychology
Assigned: SAM

Khan Nguyen
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(312) 849-1362

Degree: M.S., Mathematics, 1984
Specialty: Mathematics
Assigned: APL

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Degree: B.A., Biology, 1987
Specialty: Biology
Assigned: SAM

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Degree: B.S., Chemistry, 1982
Specialty: Chemistry
Assigned: SAM

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Degree: B.S., Engineering Mechanics, 1986
Specialty: Engineering Mechanics
Assigned: ML

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Degree: B.S., Chemical Engr., 1984
Specialty: Chemical Engineering
Assigned: LMC

Susan Poppens
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Degree: B.S., Math/Comp. Sci., 1985
Specialty: Math/Computer Science
Assigned: ESMC

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Degree: B.S., Chemistry, 1986
Specialty: Chemistry
Assigned: ML

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Aerospace Dept.
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College of Engineering
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Degree: B.S., Aerospace, 1987
Specialty: Aerospace
Assigned: FJSRL

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Degree: B.S., Electrical Eng., 1987
Specialty: Electrical Engineering
Assigned: FDL

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Degree: M.S., Electrical Eng., 1972
Specialty: Electrical Engineering
Assigned: SAM

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Degree: B.S., Sociology, 1976
Specialty: Sociology/Psychology
Assigned: SAM

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Degree: M.S., Mechanical Eng., 1987
Specialty: Mechanical Engineering
Assigned: AEDC

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Degree: M.S., Civil Engr., 1984
Specialty: Civil Engineering
Assigned: FDL

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Degree: M.S., Mechanical Engr., 1986
Specialty: Mechanical Engineering
Assigned: APL

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Degree: M.S., Mechanical Engr., 1985
Specialty: Mechanical Engineering
Assigned: ML

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Specialty: Mechanical Engineering
Assigned: FDL

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Specialty: Physics/Astronomy
Assigned: AFGL

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Degree: B.S., Physics, 1985
Specialty: Physics
Assigned: ML

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Degree: B.S., Mechanical Engr., 1979
Specialty: Mechanical Engineering
Assigned: WL

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Degree: B.S., Electrical Engr., 1985
Specialty: Electrical Engineering
Assigned: WL

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Degree: B.S., Computer Engr., 1986
Specialty: Computer Engineering
Assigned: RADC

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Degree: M.S., Mathematics, 1985
Specialty: Mathematics
Assigned: RADC

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Degree: B.S., Computer Engr., 1986
Specialty: History
Assigned: RADC

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Degree: M.S., Physics, 1987
Specialty: Physics/Astronomy
Assigned: AFGL

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Dept. of Civil & Environ. Eng.
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(509) 335-8546

Degree: M.S., Geological Engr., 1984
Specialty: Geological Engineering
Assigned: ESC

Tien Tran
Dept. of Electr. & Comp. Eng.
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(513) 851-7350

Degree: B.S., Electrical Engr., 1980
Specialty: Electrical Engineering
Assigned: RADC

John Usher
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Degree: M.S., Industrial Engr., 1986
Specialty: Chemical Engineering
Assigned: ML

Pretta VanDible
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(713) 857-2827

Degree: M.S., Chemical Engr., 1986
Specialty: Chemical Engineering
Assigned: RPL

William VanValkenburgh
Dept. of Computer Science
Western Michigan University
Kalamazoo, MI 49008
(616) 385-5961

Degree: B.S., Computer Science, 1986
Specialty: Computer Science
Assigned: AL

Joseph Varga
Dept. of Physics
Kent State University
Kent, OH 44242
(216) 672-2246

Degree: M.S., Physics, 1978
Specialty: Physics
Assigned: ML

Deborah Vezie
Dept. of Chemical, Biomedical
Materials Engineering
University of Arizona
Tempe, AZ 85281
(602) 784-8221

Degree: B.S., Biomedical Engr., 1987
Specialty: Biomedical Engineering
Assigned: ML

James Wade
Dept. of Astronautical Eng.
University of Illinois
Urbana, IL 61801
(217) 244-0743

Degree: B.S., Physics, 1986
Specialty: Astronautical Engineering
Assigned: WL

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Dept. of Mathematics
Eastern Washington University
Cheney, WA 99004
(509) 359-6225

Degree: B.S., Mathematics, 1986
Specialty: Mathematics
Assigned: AD

Terri Wilkerson
School of Medicine
Wright State University
Dayton, OH 45324
(513) 873-2934

Degree: B.S., Electrical Eng., 1985
Specialty: Electrical Engineering
Assigned: AAMRL

Douglas Wise
Dept. of Mechanical Eng.
University of Dayton
Oakwood, OH 45419
(513) 298-9073

Degree: B.S., Mechanical Engr., 1986
Specialty: Mechanical Engineering
Assigned: ML

APPENDIX II C

PARTICIPANT LABORATORY ASSIGNMENT

C. PARTICIPANT LABORATORY ASSIGNMENT (Page 1)

1987 USAF/UES GRADUATE STUDENT SUMMER SUPPORT PROGRAM

AERO PROPULSION LABORATORY (AFWAL/APL)
(Wright-Patterson Air Force Base)

1. David R. Bosch
2. John N. Bullock
3. Craig A. Langenfeld
4. Khan V. Nguyen
5. James P. Seaba

ARMAMENT LABORATORY (AD)
(Eglin Air Force Base)

1. Thomas K. Harkins
2. Christopher Leger
3. Otto M. Melko
4. Randall F. Westhoff

ARMSTRONG AEROSPACE MEDICAL RESEARCH LABORATORY (AAMRL)
(Wright-Patterson Air Force Base)

1. Robyn A. Butcher
2. Tamara Della-Rodolfa
3. Steve L. Dixon
4. Beverley A. Gable
5. Deborah Gagnon
6. Beverly E. Girten
7. Laura M. Giusti
8. Nadia C. Greenidge
9. Deborah E. Hollenbach
10. Stephen R. Jenei
11. A. Jeannine Lincoln
12. Lisa M. Morris
13. Terri L. Wilkerson

ARNOLD ENGINEERING DEVELOPMENT CENTER (AEDC)
(Arnold Air Force Station)

1. James A. Drakes
2. David L. James
3. Matthew B. McBeth
4. Veronica L. Minsky
5. Filiberto Santiago

AVIONICS LABORATORY (AFWAL/AL)
(Wright-Patterson Air Force Base)

1. Kevin Cahill
2. James W. Mattern
3. Frank W. Moore
4. William B. VanValkenburgh

DEFENSE EQUAL OPPORTUNITY MANAGEMENT INSTITUTE (DEOMI)
(Patrick Air Force Base)

1. Gloria Z. Fisher

EASTERN SPACE AND MISSILE CENTER (ESMC)
(Patrick Air Force Base)

1. Susan A. Poppens

ENGINEERING SERVICE CENTER (ESC)
(Tyndall Air Force Base)

1. Jeffrey Girard
2. David W. Landis
3. Sharon K. Landis
4. Ethan S. Merrill
5. Teresa A. Taylor

C. PARTICIPANT LABORATORY ASSIGNMENT (Page 2)

FLIGHT DYNAMICS LABORATORY (AFWAL/FDL)
(Wright-Patterson Air Force Base)

1. Susan M. Dumbacher
2. Thomas J. Enneking
3. Mark E. Neumeier
4. Bryan P. Riddiford
5. Gregory A. Schoeppner
6. Christopher Sierra

FRANK J. SEILER RESEARCH LABORATORY (FJSRL)
(USAF Academy)

1. Stephen A. Huyer
2. Mark A. Reavis

GEOPHYSICS LABORATORY (AFGL)
(Hanscom Air Force Base)

1. Scharine Kirchoff
2. Gregory C. Sloan
3. Tod E. Strohmayer

HUMAN RESOURCES LABORATORY/LR (HRL/LR)
(Wright-Patterson Air Force Base)

1. Stephen Morgan

HUMAN RESOURCES LABORATORY/MO (HRL/MO)
(Brooks Air Force Base)

1. Catherine A. Aubertin
2. Andrew D. Carson

HUMAN RESOURCES LABORATORY/OT (HRL/OT)
(Williams Air Force Base)

1. Jerome I. Nadel

LOGISTICS MANAGEMENT CENTER (LMC)
(Gunter Air Force Station)

1. Douglas E. Phillpott

MATERIALS LABORATORY (AFWAL/ML)
(Wright-Patterson Air Force Base)

1. Mark T. Anater
2. Petar Arsenovic
3. Steven W. Bucey
4. Richard B. Davidson
5. Charles W. Norfleet
6. Mark Prazak
7. Jon A. Shupe
8. Elisabeth Smela
9. John M. Usher
10. Joseph C. Varga
11. Deborah L. Vezie
12. Douglas L. Wise

OCCUPATIONAL AND ENVIRONMENT HEALTH LABORATORY (OEHL)
(Brooks Air Force Base)

1. Donna N. Edwards
2. Inge B. Ford-Belgrave
3. Gary F. Lake
4. Randal L. Mandock
5. Roland A. Medellin
6. Steven J. Naber

C. PARTICIPANT LABORATORY ASSIGNMENT (Page 3)

ROCKET PROPULSION LABORATORY (RPL)
(Edwards Air Force Base)

1. George H. James, III
2. Pretta L. VanDible

ROME AIR DEVELOPMENT CENTER (RADC)
(Griffiss Air Force Base)

1. Michele E. Johnson
2. Louise Stark
3. Steven J. Steinsaltz
4. John H. Stewman
5. Tien N. Tran

SCHOOL OF AEROSPACE MEDICINE (SAM)
(Brooks Air Force Base)

1. Antoinne C. Able
2. Otis Cosby, Jr.
3. Kathy S. Enlow
4. Edward M. Gellenbeck
5. Maurice B. Gilbert
6. Adrieine L. Hollis
7. Yolanda A. Malone
8. Jennifer B. McGovern
9. Conrad R. Murray
10. Victoria T. Nasman
11. Wendy T. Nguyen
12. Bernadette Patricia Njoku
13. Keith A. Riese
14. Mary C. Robinson

WEAPONS LABORATORY (WL)
(Kirtland Air Force Base)

1. David C. Carpenter
2. Kyunam Choi
3. James A. Gerald
4. Kenneth C. Jenks
5. Bruce Liby
6. Rita Smith
7. Brian K. Spielbusch
8. James W. Wade

APPENDIX III

A. Listing of Research Reports Submitted in the 1987 Graduate Student Summer Support Program

B. Abstracts of the 1987 Summer Fellow's Research Reports

APPENDIX III A

LIST OF RESEARCH REPORTS

RESEARCH REPORTS

1987 GRADUATE STUDENT SUMMER SUPPORT PROGRAM

Technical Report Number	Title	Graduate Researcher
Volume I		
1	Effect of Repeated Low Dose Soman On Acetylcholinesterase Activity *** Same Report as Prof. Maleque ***	Antoinne C. Able
2	Synthesis of an Aromatic Heterocyclic Terphenyl Monomer	Mark T. Anatar
3	Characterization of Graphite Fibers by X-ray Diffraction	Petar Arsenovic
4	An Eight-Domain Framework for Understanding Intelligence and Predicting Intelligent Performance ***Same Report as Prof. Dillon***	Catherine A. Aubertin
5	Configuration Factors for Spacecraft/ Expansible Radiator Interaction	David R. Bosch
6	Computer Evaluation of Ion-Implanted Dopant Profile Evolution During Annealing	Steven W. Bucey
7	The Interface Contribution to GaAs/Ge Heterojunction Solar Cell Efficiency ***Same Report as Prof. Wu***	John N. Bullock
8	Isolation of Osteogenic Cells From The Trauma-Activated Periosteum	Robyn A. Butcher
9	A Test Chip for Evaluation of MBE Epitaxial Layers for Novel Device Applications ***Same Report as Prof. Roenker***	Kevin Cahill
10	Preliminary Thermal Analysis of a Bimodal Nuclear Rocket Core	David C. Carpenter
11	Air Force Officer Selection Revisited: Entertaining The Possibilities for Improvement ***Same Report as Dr. Appel***	Andrew D. Carson

12	Construction of a Phase Conjugate Laser Resonator Using Brillouin Enhanced Four Wave Mixing	Kyunam Choi
13	Effect of Repeated Low Dose Soman On Acetylcholinesteease Activity ***Same Report as Prof. Maleque***	Otis Cosby, Jr.
14	Ten Weeks of Literature Searches and Copying	Richard B. Davidson
15	Ambiguity and Probabilistic Inference in a Missile Warning Officer Task ***Same Report as Prof. Robertson***	Tamara Della-Rodolfa
16	Modeling Rates of Halocarbon Metabolism (VMAX) Using Quantitative Structure-Activity Relationships (QSAR)	Steve L. Dixon
17	Directed Motion Doppler Shift Effects on Mitric Oxide (0,0) Gamma Band Resonance Absorption	James A. Drakes
18	Preliminary Applications of Decentralized Estimation to Large Flexible Space Structures	Susan M. Dumbacher
19	Disposal of Chemotherapeutic Wastes ***Same Report as Dr. Masingale***	Donna N. Edwards
20	Validity of Heat Index as Indicator of Level of Heat Storage for Personnel Wearing Protective Clothing in Hot Environments	Kathy S. Enlow
21	Investigation into the Applicability of Fracture Mechanics Techniques to Aircraft Wheel Life Studies	Thomas J. Enneking
22	Construction and Preliminary Validation of an Equal Opportunity Climate Assessment Instrument ***Same Report as Prof. Landis***	Gloria Z. Fisher
23	An Analysis of the Mutagenicity of Beryllium Compounds Using the Ames Test	Inge B. Ford-Belgrave
24	The Effects of High Noise Levels on the Acoustic-Phonetic Structure of Speech: A Preliminary Investigation	Beverley A. Gable

25	The Effect of Attentional Focus Level on Task Performance Utilizing Information From Different Stimulus Structure Levels	Deborah Gagnon
26	Providing On-Line Guidance To Computer Users	Edward M. Gellenbeck
27	Mode Extraction From an Electromagnetic Slow Wave System	James A. Gerald
28	Mesopic Visual Performance With and Without Glare in Contact Lense Wearers	Maurice B. Gilbert
29	Ground Run-Up Afterburner Detection and Noise Suppression	Jeffrey Girard
30	Alterations of Segmental Volume During Orthostatic Stress in Nonhuman Primates	Beverly E. Girten
31	Designing Simulator Tasks to Study the High Speed, Low Altitude Environment	Laura M. Giusti
32	A Comparative Study of the Thoraco-Lumbar Transition Vertebrae In MACACA Mulatta and PAPIO Anubis	Nadia C. Greenidge
33	Six Degree of Freedom Simulation Computer Program for Aeroelastic Free-Flight Projectiles	Thomas K. Harkins
34	Sustained Delivery of Volatile Chemicals By Means of Ceramics ***Same Report as Dr. Bajpai***	Deborah E. Hollenbach
35	The Effects of Hyperbaric Oxygen and Antioxident Deficiencies on Rat Retinal Ultrastructure	Adrienne L. Hollis
36	A Comparative Study of Differing Vortex Structures Arising in Unsteady Separated Flows	Stephen A. Huyer
37	Perturbed Functional Iteration Applied to the Navier-Stokes Equations	David L. James
38	An Optical Sensor System for Monitoring Structural Dynamics with Applications to System Identification	George H. James, III

39	Delivery of Inhibin by ALCAP Drug Delivery Capsules	Stephen R. Jenei
40	No Report Submitted	Kenneth C. Jenks
41	A System to Investigate Synthesized Voice Feedback in Man-Machine Interfaces	Michele E. Johnson
42	A Study of Small, Shallow Earthquakes and Quarry Blasts in Healy, Alaska	Scharine Kirchoff
43	A Study of Service Demand Distribution and Task Organization for the Analysis of Environmental Samples and Associated Support Services at the USAF Occupational and Environmental Health Laboratory - Brooks AFB, San Antonio, TX ***Same Report as Dr. Deal***	Gary F. Lake
44	Wave Propogation in Layered Structures	David W. Landis
45	Installation of the Adina FEM Computer Programs	Sharon K. Landis
46	Experimental Study of Isothermal Flows in a Dump Combustor	Craig A. Langenfeld
47	A Computer Simulation of a Plasma Armature Railgun	Christopher Leger
48	Investigation of Laser Diode Coupling Using Nonlinear Optics	Bruce Liby
49	Isolation of Osteogenic Cells From The Trauma-Activated Periosteum	A. Jeannine Lincoln
50	The Effects of Cataract Surgery on Pupillary Response	Yolanda A. Malone
51	Liquid Scintillation Counting with the Packard 1500 Analyzer	Randal L. Mandock
52	De-embedding S-parameter Measurements Using TSD Technique	James W. Mattern
53	An Expert System for Diagnosis and Repair of Analog Circuits	Matthew B. McBeth

Volume II

67	Vaporization Behavior of Multicomponent Fuel Droplets in a Hot Air Stream ***Same Report as Dr. Aggarwal***	Khan V. Nguyen
68	Growth Curve and Phototaxis Assays of Axenic Chlamydomonas reinhardtii 125	Wendy T. Nguyen
69	Microesotropia Patients Perform Well as Military Jet Pilots	Bernadette P. Njoku
70	Determination of Lumped-Mass Thermal Properties Associated with Autoclave Curing of Graphite/Epoxy Composites	Charles W. Norfleet
71	Equitable Safety Stocks for USAF Consumable Items	Douglas E. Phillpott
72	Investigation of Expert System Design Approaches for Electronic Design Environments	Susan A. Poppens
73	Thermal Stability Characteristics of a Nonflammable Chlorotrifluorethylene CTFE Base Stock Fluid	Mark Prazak
74	Control and Use of Unsteady Flows: Insect Use of Various Wing Kinematics and Related Pressure Measurements Using a Pitching Airfoil	Mark Reavis
75	Aircraft Refueling Demonstrator Using a Microbot Alpha II Robot	Bryan P. Riddiford
76	Influence of Moving Visual Environment on Saccadic Eye Movements and Fixation	Keith A. Riese
77	Thermal Stress and its Effects on Fine Motor Skill and Decoding Tasks	Mary C. Robinson
78	Design of a Mechanism to Control Wind Tunnel Turbulence	Filiberto Santiago
79	Low Velocity Impact of Graphite/Epoxy Plates ***Same Report as Prof. Wolfe***	Gregory A. Schoeppner
80	Experimental Research of Combustion Systems	James P. Seaba
81	The Integration of Decision Support Problems into Feature Modeling Based Design	Jon A. Shupe

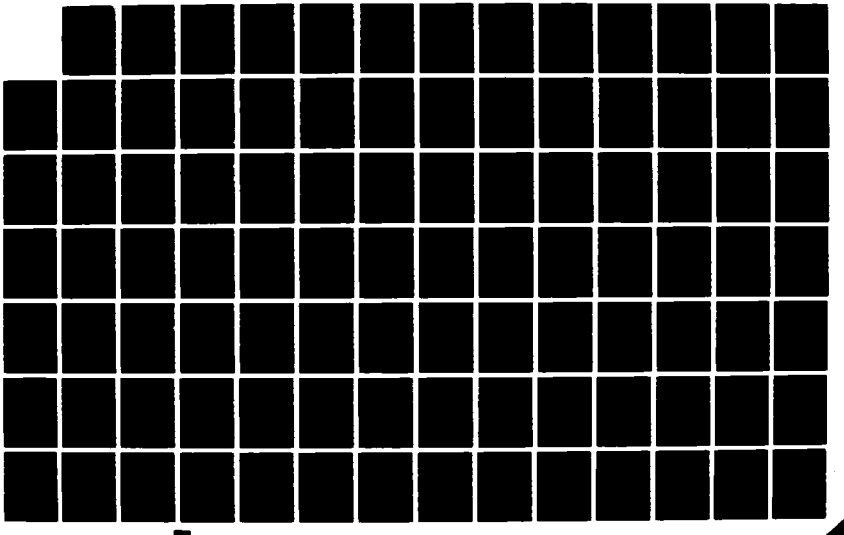
82	Optimal Control of the Wing Rock Phenomenon	Christopher Sierra
83	Calibration and Data Reduction Techniques for the AFGL Infrared Array Spectrometer	Gregory C. Sloan
84	Thermal conductivity of isotopically pure semiconductors, superlattices, semiconductor alloys, and semiconductors as a function of temperatures; control of the segregation coefficient in LEC crystal growth; and photo-Hall measurements of GaAs	Elisabeth Smela
85	Predicting Optical Degradation of a Laser Beam Through a Turbulent Shear Layer	Rita Smith
86	Experimental Verification of Imaging Correlography ***Same Report as Dr. Knopp***	Brian K. Spielbusch
87	An Aspect Graph-Based Control Strategy for 3-D Object Recognition	Louise Stark
88	Linear Programming for Air Force Decision Aiding	Steven J. Steinsaltz
89	Creating Aspect Graphs for Use in Object Recognition	John H. Stewman
90	Analysis of Emission Features in IRAS LRS Spectra	Tod E. Strohmayer
91	Centrifuge Modeling of Projectile Penetration in Dry, Granular Soil	Teresa A. Taylor
92	Optical Interconnections for Digital Image Coding	Tien N. Tran
93	An Investigation of Performance Improvement in Knowledge-Based Control Systems	John M. Usher
94	Computer Modelin for Surface Properties of Carbon Fibers	Pretta L. VanDible
95	An Advanced Vision System Testbed ***Same Report as Prof. Trenary***	William B. VanValkenburgh

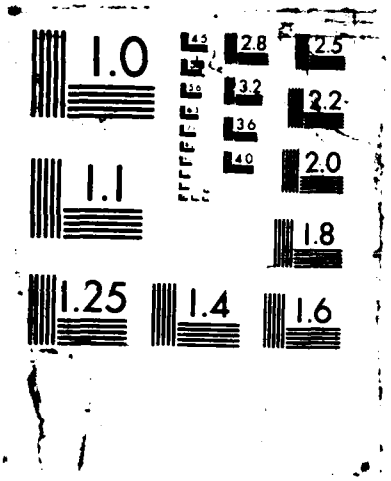
96	Numerical Calculations of Dopant Diffusion involving flashlamp heating of silicon	Joseph C. Varga
97	Scanning Electron Microscopy of PBO, PBT, and Kevlar Fiber Due to sensititve nature of report cannot be published at this time	Deborah L. Vezie
98	Self Induced Deformations in a Space-Based Electromagnetic Rail Gun	James W. Wade
99	Hole Diameters in Plates Impacted by Projectiles	Randall F. Westhoff
100	Human Response to Prolonged Motionless Suspension in Four Types of Full Body Harnesses	Terri L. Wilkerson
101	Late Appointment Date No Report Submitted at this time	Douglas L. Wise

APPENDIX III B

ABSTRACTS

AD-A191 202 UNITED STATES AIR FORCE GRADUATE STUDENT SUMMER SUPPORT 2/3
PROGRAM (1987) PR..(U) UNIVERSAL ENERGY SYSTEMS INC
DAYTON OH R C DARRAH ET AL. DEC 87 AFOSR-TR-88-0200
UNCLASSIFIED F49620-85-C-0013 F/G 5/1 NL

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EFFECT OF REPEATED LOW DOSE SOMAN ON ACETYLCHOLINESTERASE ACTIVITY

By

MOHAMMED A. MALEQUE, PH.D.
Antoinne Able, Otis Cosby, Jr.

ABSTRACT

Acetylcholinesterase activity was measured in rodents during repeated low dose soman exposure and following the cessation of exposure by spectrophotomeric and radioisotopic methods. A repeated single dose of soman (39.0 ug/kg., s.c.) inhibited the acetylcholinesterase activity both in rat blood serum and brain hippocampus and amygdala. However, the degree of inhibition varied from one tissue to another. Similarly to the differential inhibition, recovery of the enzyme activity was also observed following the cessation of soman exposure over a 5 day period. This research was conducted as part of a larger study which is attempting to measure the effect of repeated soman on biochemistry, neurohistology, and performance in either the same subjects or in subjects matched for soman poisoning. The study will provide a unique opportunity to obtain neurochemical information concurrently with information on neurohistological changes and performance.

Mark Anater

Abstract Not Publishable At This Time

Characterization of Graphite Fibers by X-ray Diffraction

by

Petar Arsenovic

ABSTRACT

Samples of different types of graphite fibers were prepared for measurement in a Picker diffractometer. Young's modulus and crystallite orientation measurements were made, as well as equatorial and meridional scans on the fibers. The results show that the higher modulus fibers have improved crystallite orientation, and that applying tensile stress will increase the orientation by a small amount. The diffraction peaks become less sharp for fibers with a lower modulus. This work was an important step toward the formulating of a model that will explain the mechanical behavior of graphite fibers in terms of their internal structure.

AN EIGHT-DOMAIN FRAMEWORK FOR UNDERSTANDING INTELLIGENCE AND PREDICTING INTELLIGENT PERFORMANCE

by

Ronna F. Dillon
Catherine Aubertin

ABSTRACT

This paper describes my participation in the 1987 Summer Faculty Research Program in the Test and Training Branch of the Air Force Human Resources Laboratory at Brooks Air Force Base. My activities centered on elucidation of an eight-domain model of aptitude and use of the model in (a) conceptualizing and writing materials for a national research symposium on measuring and predicting professional competence across a range of professions and for a biennial conference on individual differences in cognition and learning, and (b) undertaking a program of research on the importance of measures of each domain for predicting school and job performance among Air Force recruits. The eight-domain framework taps processing capacity, processing speed, declarative knowledge, information-processing components, information-processing metacomponents, rule induction skill, verbal and visiospatial knowledge manipulation skills, and cognitive flexibility.

Configuration Factors for Spacecraft/Expansible Radiator Interaction

by

David R. Bosch

ABSTRACT

The configuration factors for approximating the interaction between a expansible radiator and a spacecraft body are needed to determine the overall performance of the radiator. Research was done to determine the availability of the needed configuration factors. They were not available for the desired geometry. Therefore, the program called VIEW (written under the supervision fo A.F. Emery of the University of Washington in Seattle) was adopted to calculate them. Because of a late start, and other problems, the work was not yet finished at the time of this publication.

Computer evaluation of ion-implanted

dopant profile evolution during annealing

by

Steven W. Bucey

ABSTRACT

The project is to study the partial annealing of dopant implanted GaAs or silicon. Dr. David Moroi has developed an analytical solution for the concentration profile during ion-implantation which had not been evaluated. A computer analysis was made to compare with a numerical solution. For the case of the linear dependence of the diffusion parameter excellent agreement was found between the solutions for a constant diffusion, but for a concentration dependence an overall relative error of about 5% is shown over the range of significant concentration.

The Interface Contribution to GaAs/Ge Heterojunction Solar Cell Efficiency

by

Cheng-Hsiao Wu

and

John Bullock

ABSTRACT

A solar cell formed by growing a p on n AlGaAs/GaAs heteroface homojunction on a thin Ge substrate is studied by investigating the contribution of the GaAs/Ge heterostructure to the solar cell efficiency. The existence of interface states is required in order to produce the photovoltaic effect with an open-circuit voltage of about 0.1 volt as experimentally observed. Dark current-voltage characteristics of the GaAs/Ge heterojunction are calculated when the carrier transport is by thermionic emission and tunneling mechanisms. Our evaluations correctly explain the decrease of efficiency and fill factor, the increase of open-circuit voltage and the insignificant change of short-circuit current as compared to GaAs/GaAs solar cell. If the short-circuit current from the heterojunction is of the order of 100mA or less, the reduction of the solar cell efficiency is about 0.5% to 1.5% over a wide range of GaAs/Ge doping concentrations. A low interface-state condition will degrade the fill factor while soft-breakdown in the reverse-biased region will increase the fill factor. The efficiency is controlled by the forward-biased part of the dark I-V curve. Increase of total efficiency is possible if only a small amount of interface states is generated.

Isolation of Osteogenic Cells From The Trauma-Activated Periosteum

By

Robyn A. Butcher

Abstract

Closed, greenstick type fractures were created in adult male white New Zealand rabbits. After a waiting period of 5 days the developing callous and bone approximately 1 cm to each side of the callous was harvested and cell cultures established. Biochemical assays for total protein, alkaline phosphatase activity and glycosamino-glycan content were performed on spent media collected at each change and upon the cells after their termination, in an attempt to more fully characterize the osteoblast population. Since little is known about bone forming cells isolated from this source it is important to establish baseline data so as to be able to relate reactions of these cells to altered environmental conditions.

A TEST CHIP FOR CHARACTERIZATION OF MBE EPITAXIAL LAYERS FOR NOVEL DEVICE APPLICATIONS

by

Kenneth P. Roenker and Kevin P. Cahill

ABSTRACT

A custom test chip has been designed containing some 71 individual transistors, test structures and circuits for the purpose of aiding the demonstration and development of novel semiconductor transistor designs employing multiple molecular beam epitaxial (MBE) layers similar to the heterojunction bipolar transistor. In particular the test chip was designed to assist in the development of the inversion base transistor (IBT) and the bipolar inversion channel field-effect transistor (BICFET). Utilizing the same multi-layer MBE substrate and fabrication process employed in the construction of the novel transistor of interest, the use of the test chip's mask set results in the fabrication of a set of twelve transistors of various sizes and geometries, a number of basic devices and test structures, and a few simple circuits. Since these structures are composed of the same epitaxial layers, contain the same interfaces between materials and are fabricated using the same process; electrical measurements of these structures can provide information on layer properties, interfacial quality, fabrication process results and device physics. These data can provide insight into fabrication difficulties and experimental phenomena that may limit transistor action or performance. This report provides a brief summary of each test structure, its construction and its electrical characterization. A more detailed description of each test structure, its critical dimensions and operation is available in a separate document. References are provided for further study of each test structure's utility.

Preliminary Thermal Analysis of a Bimodal Nuclear Rocket Core

by

David C. Carpenter

ABSTRACT

The framework for a general purpose finite element analysis code was developed to study the 2-D temperature distribution in a hot-channel hexagonal fuel element in the core of a bimodal nuclear rocket. Preliminary thermal-hydraulic analysis of the core pressure drops under helium coolant conditions were also performed. Hydrogen coolant analysis was not performed due to insufficient property data in a usable form. Although the thermal gradients observed in the fuel element did not seem to present a problem, a more detailed thermal stress analysis was initiated. The stress analysis is not fully implemented in the code at this time. Code development also progressed into 3-D temperature distributions in anticipation of projected research.

Air Force Officer Selection Revisited: Entertaining The Possibiliities for Improvement

by

Victor H. Appel

and

Andrew D. Carson

ABSTRACT

Research literature was examined to identify selection devices or methodological/conceptual developments appearing promising as a means for enhancing the system of officer selection for Officer Training School and Air Force ROTC candidates. In that the current system is focused almost exclusively on cognitive/intellective predictors, the investigators sought to broaden the scope by incorporating predictors of other likely sources of variance, particularly leadership/managerial and commitment variables. Recommendations are offered how such constructs might be tapped by incorporating an appropriate biodata form within the existing selection device, the AFOQT. Experimentation over the long run with an assessment center methodology is also proposed.

CONSTRUCTION OF A PHASE CONJUGATE LASER RESONATOR USING BRILLOUIN ENHANCED FOUR WAVE MIXING

by

Kyunam Choi

ABSTRACT

A study on the realization of a phase conjugate laser resonator employing the Brillouin enhanced four wave mixing as its main phase conjugation mechanism is discussed. The resonator output beam can maintain monochromatic laser wavelengths with excellent temporal and spatial beam profile while enjoying high phase-conjugate fidelity. Details on experimental procedures together with experimental results are reported.

EFFECT OF REPEATED LOW DOSE SOMAN ON ACETYLCHOLINESTERASE ACTIVITY

By

MOHAMMED A. MALEQUE, PH.D.
Antoinne Able, Otis Cosby, Jr.

ABSTRACT

Acetylcholinesterase activity was measured in rodents during repeated low dose soman exposure and following the cessation of exposure by spectrophotomeric and radioisotopic methods. A repeated single dose of soman (39.0 ug/kg., s.c.) inhibited the acetylcholinesterase activity both in rat blood serum and brain hippocampus and amygdala. However, the degree of inhibition varied from one tissue to another. Similarly to the differential inhibition, recovery of the enzyme activity was also observed following the cessation of soman exposure over a 5 day period. This research was conducted as part of a larger study which is attempting to measure the effect of repeated soman on biochemistry, neurohistology, and performance in either the same subjects or in subjects matched for soman poisoning. The study will provide a unique opportunity to obtain neurochemical information concurrently with information on neurohistological changes and performance.

TEN WEEKS OF LITERATURE SEARCHES AND COPYING

by

Brant Davidson

ABSTRACT

The first seven weeks of the project in Dayton were spent researching articles and books for Dr. Chu, the professor I was working for. Late in the ten week period that the project ran Dr. Chu presented me with 150 page computer program, originally written by H.L. Skriver of Risoe National Laboratory in Denmark, to copy in to a computer text file from which it could be compiled. The program is designed to calculate the band structure of certain types of superlattices. Unfortunately, it was impossible to run the program during the ten week period of my employment due to lack of time and the fact that the author forgot to specify the purpose of certain functions that are essential to the program. Dr Chu, the professor I am working for, expresses hope that he will be able to find a way to run the program running once he returns to Taledega.

Ambiguity and Probabilistic Inference in a Missile Warning Officer Task

by

Tamara J. Della-Rodolfa

ABSTRACT

Two models of the influence of ambiguity on probabilistic inference were applied to judgments of the probability that simulated sensor system data represents an attack. The SIMCOPE simulation was modified and three studies were conducted. Analysis of aggregate and individual data supported a revision of the Einhorn-Hogarth ambiguity model. Application of both models to the missile warning task indicated that (a) beliefs engendered by readiness state and intelligence reports about launch sites have a major impact on judged probability of attack and the relative influence of these contextual factors is reflected in model parameters; (b) people are sufficiently regressive in their judgments when given unreliable or ambiguous information; (c) model parameters are indicative of reliable individual differences in judgment/decision making; and (d) parameter estimates from single cue models can be used to predict accurately judgments in multiple cue scenarios. Models of probabilistic inference which incorporate ambiguity may be useful in identifying potential sources of judgmental error and in providing a

model of human judgment necessary for development of adaptive decision aids.

MODELING RATES OF HALOCARBON METABOLISM (VMAX) USING QUANTITATIVE STRUCTURE-ACTIVITY RELATIONSHIPS (QSAR)

by

Steve Dixon

ABSTRACT

Vmax values were obtained *in vivo* with male rats for chlorinated methanes, ethanes and ethenes by gas uptake methods. A QSAR study of Vmax was carried out with electronic and steric chemical descriptors. Partial atomic charges served as electronic parameters. Chlorine substitution patterns were used to imply steric information. For 10 well-metabolized chemicals, the best 2-term fit (r^2=0.981) involved the sum of all hydrogen charges in the molecule and the difference between the numbers of chlorines and hydrogens on the least substituted carbon. Two poorly metabolized chemicals (CCl_4 and CH_3CCl_3) were added to the data set and a more qualitative approach taken. For methanes and ethanes, metabolism required a chlorine and hydrogen on the same carbon; in methanes with two or more chlorines, the effect of replacing a chlorine with a methyl group is slight and predictable; for ethanes and ethenes, larger Vmax occur for chemicals with two nonequivalent carbons. These structural features were combined with a connectivity index and quantitated in a 3 parameter fit (r^2=0.934).

Directed Motion Doppler Shift Effects on Nitric Oxide (0,0) Gamma Band Resonance Absorption

by

James A. Drakes

Abstract

An investigation into the effects of flowfield-induced Doppler shifts was performed. The directed motion Doppler shift arises in expanding flowfields where the gas molecules are traveling with non-parallel trajectories. It was found that the shifting of the line center frequency of the absorption lines in the medium, caused by the gas expansion, lead to a marked increase in the transmittance of the medium. Our study examined a absorbing conical flow, using both a homogeneous and an annular NO number density profile. For the homogeneous model, the transmittance at the second band head, located at approximately 2262 Angstroms, was increased in the range of 5- to 17- percent upon the inclusion of flowfield Doppler shifts, depending on the exit velocity of the flow. The transmittance at the second band head of the annular flowfield showed an increase with the inclusion of the directed motion Doppler shift of from 8- to 22- percent, varying with the exit velocity.

PRELIMINARY APPLICATIONS OF DECENTRALIZED ESTIMATION TO LARGE FLEXIBLE SPACE STRUCTURES

by

Susan M. Dumbacher

ABSTRACT

The advent of space travel requires the examination of Large Flexible Space Structures (LFSS) as a means to achieve it. Much experimentation is being done in the field of control and estimation of parameters on these structures, since adequate testing cannot be done on earth to determine exactly the damping, frequencies and mode shapes of these structures. To vibrationally suppress a LFSS, or maintain it at a state of equilibrium, actuators and sensors are placed at various locations along the structure which are then used to damp out selected modes. To determine modal positions and velocities of a LFSS, decentralized estimation/control is examined here as an alternative to a fully centralized system.

DISPOSAL OF CHEMOTHERAPEUTIC WASTES

by

Robert E. Masingale, Sr.
Donna Edwards

ABSTRACT

Air Force medical facilities are generating chemotherapeutic wastes from care and treatment of oncologic cases. Proper disposal of these wastes are dependent upon guidelines that are currently insufficient or nonexistent. A survey reveals that the majority of Air Force medical facilities generated a small quantity of chemotherapeutic waste and that less than 5% of Air Force medical facilities were responsible for the majority of the chemotherapeutic wastes. Many facilities are disposing their chemotherapeutic waste in pathological incinerators. This study focused on exploring chemical deactivation and incineration as disposal methods. Chemical deactivation was explored as an alternate means for facilities with limited access to cost-effective disposal systems. Incineration was also investigated because it was stated to be the disposal method of choice.

Validity of Heat Index as Indicator of Level of Heat Storage for Personnel Wearing Protective Clothing in Hot Environments

by

K. Suzanne Enlow

ABSTRACT

The use of protective clothing such as the Chemical Defense Ensemble (CDE) in moderate to hot environments substantially reduces work capacity due to heat stress. The purpose of this research was to determine the validity of a heat stress index in predicting the level of heat storage when used during work/rest cycles with intermittent microenvironmental cooling...

Investigation into the Applicability of Fracture Mechanics Techniques to Aircraft Wheel Life Studies

by

Thomas J. Enneking

ABSTRACT

In response to a specified logistic need, an in-house program was initiated in late 1986 to investigate test and analytical methods for wheel life estimation and verification. In conjunction with this program, an additional ten week study was initiated June 1, 1987 to explore analytical techniques for fatigue analysis and experimental methods to verify these analytical techniques. In particular, the applicability and feasibility of applying fracture mechanics concepts to aircraft wheel assemblies was assessed. A detailed literature review was performed to identify current research activity involving aircraft wheels and fatigue studies. This was expanded to include finite element techniques and stochastic methods as applied to wheel life and reliability estimates. Based on the results of this study, and previous studies, a combined analytical and experimental methodology was proposed for the estimation and verification of aircraft wheel service life. This proposed multi-task approach contains several alternatives within the individual tasks. The optimum alternatives, i.e., those with the highest probability of success and an acceptable cost (effort), will be the object of further studies.

An Analysis of the Mutagenicity of Beryllium Compounds using the Ames Test

by Inge B. Ford

I. Abstract

Unprotected exposure to beryllium and its alloys has been associated with an array of clinical disorders, including alterations in molecular genomes in both animals and humans. Beryllium will be induced with several strains of *Salmonella typhimurium* (each strain is specific for a type of mutagen) and cytosol fractions of mammalian cells in order to determine its mutagenic capacity. The intent of this analysis is:

(1) to determine whether beryllium and/or its alloys are indeed mutagenic;

(2) to determine the degree of mutagenicity of beryllium alloys;

(3) to determine if beryllium metabolites have mutagenic properties utilizing the Ames test;

(4) to analyze microscopically if tissues, other than those known today, are affected by the metal; and

(5) to determine to what extent the metal affects the tissue within mammalian systems.

CONSTRUCTION AND PRELIMINARY VALIDATION OF AN EQUAL OPPORTUNITY CLIMATE ASSESSMENT INSTRUMENT

by

Dan Landis, Ph.D.
and
Gloria Fisher, M.Ed., M.S.

ABSTRACT

Construction and preliminary validation of an instrument to assess equal opportunity climate in the military was begun. The research was conducted at the Defense Equal Opportunity Management Institute (DEOMI) at Patrick Air Force Base, FL. Students who are undergoing equal opportunity training at the institute served as subjects. A definition of equal opportunity climate is provided. A model linking equal opportunity climate to other organizational variables is also presented. Preliminary results in the development of the assessment instrument indicate that it is reliable and has some measure of construct validity. Further laboratory research and field validation among a random selection of military bases are recommended.

The Effects of High Noise Levels on the Acoustic-Phonetic Structure of Speech: A Preliminary Investigation

by

B.A. Gable

ABSTRACT

The purpose of this study was to provide some preliminary data concerning the acoustic-phonetic structure of speech produced under high noise levels. Acoustical measurements were made of a set of sentences spoken by four subjects in two conditions: the 95dB noise condition and the no-noise condition. Sentences produced under 95dB noise were different from sentences produced under ambient noise in both durational and spectral characteristics.

The Effect of Attentional Focus Level on Task Performance Utilizing Information From Different Stimulus Structure Levels

by

Deborah A. Gagnon

ABSTRACT

An experiment is described that will allow for the analysis of performance on an object and scene two-alternative forced choice task under different stimulus structure attention focuses. Seventeen subjects participated in a pilot study at the State University of New York at Buffalo. Suggestions for a data analysis are made.

PROVIDING ON-LINE GUIDANCE TO COMPUTER USERS

by

Edward M. Gellenbeck

ABSTRACT

The conceptual design for an on-line guidance interface is presented. The design is based on research in user-oriented interface design and artificial intelligence. The on-line guidance interface offers help to users in goal-oriented, context-sensitive terms. It is accessed through a window on a multi-tasking computer system. The guidance interface is examined as an interface to information retrieval services. The paper concludes with a list of references in the area of user-oriented interface design.

Mode Extraction from an Electromagnetic Slow Wave System

by

James A. Gerald

Abstract

Expressions for the electromagnetic fields in a coaxial waveguide with a corrugated outer conductor were obtained. In this analysis, the depth, width, and period of the corrugations remained variable along with the radius of the inner conductor and the overall radius of the structure. Also, for the purpose of analysis, the structure has been divided into two regions, I and II. Region I is the portion of the waveguide contained within the inner radius b of the corrugated outer conductor, and Region II is the portion of the waveguide contained within the corrugations or slots. To meet the boundary conditions, several functions have been used to approximate the z-directed component of the electric field at the radius b. A comparison of how well the fields match at the radius b for each approximation has been made. The phase velocity in the slow wave structure was of particular interest, and methods for obtaining it have been presented.

Mesopic Visual Performance With and Without Glare in Contact Lense Wearers

By

Maurice B. Gilbert

ABSTRACT

Mesopic vision testing of human subjects was performed in order to examine the effects of glare on visual function. Pilot age individuals were checked and each was tested with both contact lenses and spectacles. They were examined with the aid of a nyktometer. An apparatus which tests the subject under simulated mesopic (twilight) vision conditions both with and without a glare light source. Both contacts and spectacles correct for visual acuity, yet which of the two is better for twilight visual performance. The study will generate needed data for comparison. This will allow the vision lab a chance to make recommendations concerning twilight visual needs.

GROUND RUN-UP AFTERBURNER DETECTION AND NOISE SUPPRESSION

by

Jeffrey J. Girard

ABSTRACT

Two projects were completed, both related to aircraft static engine run-up noise. A purchase description was written for an acoustic detection system to determine whether an aircraft in a shelter has engaged afterburners. A test plan was written for a test to supply information required for evaluation of noise suppression techniques employed in hush houses for ground run-up.

ALTERATIONS OF SEGMENTAL VOLUME DURING ORTHOSTATIC STRESS IN NONHUMAN PRIMATES

by

Beverly Elaine Girten

ABSTRACT

The overall goal of this project was to investigate the effect of exposure to short-term simulated weightlessness on the volume changes that occur in young adult nonhuman primates. A series of experiments involving head-up and head-down tilt protocols were conducted to test the feasibility of using impedance plethysmographic equipment and procedures to define segmental volume changes in Rhesus monkeys. The specific objectives involved monitoring the calf, thigh, pelvic, abdominal and thoracic volumes prior to, during, and following exposure to short-term orthostatic and antiorthostatic stress. Initial work on this project involved preliminary testing of the data recording system. Four adult male Rhesus monkeys were tested during this phase, and impedance plethysmography was utilized to determine segmental volume changes. Ten animals were tested during the primary experiment. The data obtained indicated that fluid exchange between the peripheral and the more central body segments was taking place during all angles of head-up or head-down, and the redistribution seems to be graded and a function of the angle of tilt. These results suggest that the peripheral arterial/venous system is able to compensate for mild stresses produced by low angles of head-up and head-down tilt; however, it is not able to maintain this compensation during or following the higher angles of tilt.

Designing Simulator Tasks to Study the High Speed, Low Altitude Environment

by

Laura Giusti

ABSTRACT

An experiment was designed as an instrument to measure the effectiveness of proposed experimental training regimes and display designs. A computer simulation of a terrain-following, terrain-avoidance task was used to determine the subjects' capabilities in the high-speed, low altitude flying environment. Subjects controlled only the pitch and altitude of their aircraft and were instructed to successfully maneuver over and between twenty equidistant buildings. Preliminary results suggest that the task will be an effective measure for evaluating training regimes and display designs.

A COMPARATIVE STUDY OF THE THORACO-LUMBAR TRANSITION VERTEBRAE IN MACACA mulatta AND PAPIO anubis.

by

Nadia C. Greenidge

ABSTRACT

The morphological characteristics of the thoraco-lumbar transition vertebrae of Macaca mulatta and Papio anubis were surveyed with the aid of a computer assisted digitizer. Linear and angular measurements of five representatives from each species were compared for both intra- and interspecies variations and differences. In addition to comparing the thoraco-lumbar vertebrae to each other they were also compared to representative thoracic and lumbar units in an effort to clearly define the amount of variation between the different vertebral levels. The rhesus monkey and the baboon exhibit a fracture locus, in respect to ejection impact injury, that is similar to that found in man. The continued use of these animals as models for human impact injury requires a close and detailed database on their specific morphologies and variations.

Six Degree of Freedom Simulation

Computer Program for Aeroelastic

Free-Flight Projectiles

by

Thomas Harkins

ABSTRACT

The objective of this research effort was to determine how much influence aeroelastic effects had on determining the aerodynamic coefficients of a free-flight projectile. These coefficients were determined from parameter estimation techniques based on rigid body motion. A general six degree of freedom simulation program was developed in FORTRAN code. The program was then modified by adding elastic inertia terms. The flight simulator was run with the rigid body aerodynamic coefficients, but the model itself was allowed to "flex" during its flight. Preliminary results showed that the body's flexing had no effect on the trajectory.

Sustained Delivery of Volatile Chemicals By Means of Ceramics

by

Praphulla K. Bajpai and Deborah E. Hollenbach

Abstract

A simple ceramic delivery system was developed for studying the toxicity of chemicals such as 1,1,1-trichloroethane (TCE) in animals. 1,1,1-trichloroethane was determined by gas chromatography. Use of glass tube inserts and Silicone® adhesive sealant for sealing the ceramic cavity provided the best results. Storing of TCE (45 mg) in glass tubes within the ceramic cavity allowed retention and delivery rate of TCE at 3595 ug/hr for eight hours in vitro. Reservoir modification of the glass tube-ceramic device to store 259 mg TCE, resulted in a sustained delivery rate of TCE (624 ug/hr) for 11 days in vitro. Analysis of hexane extracts of blood obtained from rats implanted with the glass tube-ceramic device containing 45 mg TCE, indicated that blood TCE was constant for 20 hours. Analysis of the chamber air housing a rat implanted with a similar device indicated that the level of TCE remained sustained at 1344 ug/hr for two hours. The data obtained in this investigation suggests that the ceramic system can be modified to deliver volatile chemicals in a sustained manner for studying the pharmacokinetics and toxicity of these solvents.

The Effects of Hyperbaric Oxygen and Antioxidant Nutrients on Rat Retinal Ultrastructure

by

Adrienne L. Hollis

ABSTRACT

In previous studies, we have shown that the electrophysiological response of the rat retina is rapidly diminished in animals fed diets deficient in both vitamin E and selenium for 6 weeks and treated with hyperbaric oxygen (HBO). Animals deficient in vitamin E alone also show diminished electroretinograms but only after prolonged hyperbaric oxygen treatment. Through quantitative histopathological studies, damage to the retinal pigment epithelial layer as well as the outer nuclear layer has been observed in animals fed a diet for 15 weeks that was deficient in vitamin E only. The alterations in retinal tissues observed by electrophysiology and quantitative histopathology should correlate with ultrastructural studies. In this study, we have prepared retinal tissue samples for electronmicroscopy studies and have obtained electron micrographs for future cytopathological analyses. The cytopathological parameters to be studied include outer segment disk membrane deterioration, lipofuscin content of the RPE, phagosome number in the RPE, separations betweeen tips of photoreceptors and apical surface of RPE, and migration of photoreceptor cells into the inner retina.

A Comparative Study of Differing Vortex Structures Arising in Unsteady Separated Flows

by

Stephen A. Huyer

ABSTRACT

The vortex structures arising in two separate unsteady separated flow cases were examined in detail. The flowfields resulting from the deployment of a periodically deforming leading edge (PDLE) and an oscillating flat plate were studied and compared. The PDLE produced two separate vortex structures during each cycle. It was found through flow visualization and hot-wire anemometry that these two structures exhibited different behavior. The primary vortex was characterized by low, constant velocities within the vortex, increasing threefold to 120% freestream values in a space of 3 mm. The second vortex exhibited a more even vortex rotation rate. The vortex structures produced by an oscillating flat plate were also examined. It was found that a reduced frequency of 3 yielded a more cohesive vortex compared to that produced by a reduced frequency of 1. The structures produced by PDLE deployment were also considerably weaker than those produced by an oscillating flat plate.

Perturbed Functional Iteration Applied to the Navier-Stokes Equations

by

David L. James

ABSTRACT

The Navier-Stokes partial differential equations were written as a set of averaged finite difference equations. Of the methods available, Perturbed Functional Iteration was chosen to solve the Navier-Stokes equations. The Perturbed Functional Iteration scheme (PFIS) was applied to both a two dimensional problem, both implicitly and explicitly; and a three dimensional problem, explicitly. PFIS quickly gave accurate results in the test cases.

AN OPTICAL SENSOR SYSTEM FOR MONITORING STRUCTURAL DYNAMICS WITH APPLICATIONS TO SYSTEM IDENTIFICATION

by

George Henry James III

ABSTRACT

A unique optical sensor system using video cameras, digital processing, and photogrammetric triangulation has been shown to be feasible for use in monitoring structural dynamics. The system can determine natural frequencies, mode shapes, and displacement time histories. The major advantages of the system were the possibility of non-contact measurement, ease of marker application, simple operation and upkeep, the ability to cover a large area, and exellent large amplitude and low frequency response. The major disadvantages of the system were low spatial resolution and long processing times.

Using the ERA algorithm, the first five natural frequencies of the 5 ft. by 5 ft. aluminum grid test structure were calculated in a high coverage mode, in a high resolution mode, and in a 2D mode. The first three mode shapes were calculated using ERA with the high coverage data. Recommendations for improvements in the system, future research, and possible uses are provided.

Delivery of Inhibin by ALCAP Drug Delivery Capsules

by

Stephen R. Jenei

ABSTRACT

Inhibin, a protein that blocks the secretion of follicle-stimulating hormone (FSH) has only recently begun to be accepted as a true hormone. By suppressing FSH secretion, inhibin may prevent gamete production by Sertoli cells in males. Inhibin was delivered *in vivo* in a sustained manner via alumino-calcium-phosphorus (ALCAP) oxide ceramic drug delivery capsules in albino male rats. Rats were sacrificed after one, two, three, and four weeks of implantation for histological studies of pituitary glands and reproductive organs using both light and transmission electron microscopy, and studies on sperm morphology by scanning electron microscopy. Plasma levels of LH, FSH, and testosterone were measured by radioimmunoassay, Results of this study will provide early information on the long-term effects of sustained levels of inhibin in male reproduction including regulation of FSH.

Kenneth Jenks

No Abstract Submitted

At This Time

A System to Investigate Synthesized Voice Feedback in Man-Machine Dialog

by

Michele E. Johnson

Abstract

The Rome Air Development Center (RADC), Intelligence Analysis Branch, is sponsoring an in-house research effort to study and develop advanced man-machine interfaces. At present, most interfaces consist of a keyboard and a display terminal, and feedback to a user is visual. Verbal dialog is an alternative interface that has the potential to reduce the human operator's visual load, and to take advantage of the verbal communication skills that almost every human being possesses. This paper describes the elements of a system that RADC will use to investigate verbal feedback to a human operator, more specifically to examine the interactions between synthesized message characteristics and the performance of tasks requiring comprehension of audio information. Also included is information which will be of use to those continuing this work at RADC.

A Study of Small, Shallow Earthquakes and Quarry Blasts in Healy, Alaska

by

Scharine Kirchoff

ABSTRACT

In an effort to improve the capability to discriminate between seismic events, several small, shallow earthquakes and quarry blasts located in Healy, Alaska were selected for this study. Seismic signal characteristics between the two sources' signals were discerned. An analysis of the earthquake seismogram spectra reveal more high frequency components than those of the quarry blasts. Further analysis of two distinct waveform-wavetrain envelopes in the seismograms support the high frequency content of the earthquakes. Using a theoretical modelling technique, synthetic seismograms were subsequently created to analyze how the signals depend on source and propagation differences. Recommendations to improve the fit of the individual phases in the seismograms were also made.

A STUDY OF SERVICE DEMAND DISTRIBUTION AND TASK ORGANIZATION FOR THE ANALYSIS OF ENVIRONMENTAL SAMPLES AND ASSOCIATED SUPPORT SERVICES AT THE USAF OCCUPATIONAL AND ENVIRONMENTAL HEALTH LABORATORY - BROOKS AFB, SAN ANTONIO, TEXAS

by

Don E. Deal
Gary Lake

ABSTRACT

A review of historical data was undertaken to assess the trends in and present status of the laboratory's ability to accomodate sample analysis workloads; short term projections for the growth in requests for analysis were also made for major sample classes. From numerous interviews with key supervisory and bench personnel, a list of problems and concerns was compiled which together comprised a substantial group of throughput-limiting elements. Workload projections were then analyzed in conjunction with these problem area data and with OEHL long term plans to produce a number of recommmendations for increased efficiency. These recommendations focus on glass washing turn-around, acquisition of vital personnel, lab automation, and management of contract lab participation.

Wave Propagation in Layered Structures

by

David W. Landis

ABSTRACT

Protective military shelters are typically constructed of massive, monolithic, reinforced concrete slabs. This is considered necessary in order to protect personnel and vital equipment inside the shelter from the spall caused by the high-intensity blast waves caused by conventional weaponry. Recent studies show that layered structures may be an alternative to the massive monolithic construction.

The objective of this study is to show that the implementation of layered structures can significantly reduce or eliminate the incidence of interior spalling of the concrete walls. The layered structures considered in this study are concrete-sand-concrete and concrete-polystyrene-concrete models.

This study presents the results of a numerical study to evaluate the effectiveness of layered structures in reducing the transmission of high-intensity blast waves. The results show that layered structures can be very effective in the reduction in stress wave transmission.

INSTALLATION OF THE ADINA FEM COMPUTER PROGRAMS

by

Sharon K. Landis

ABSTRACT

The ADINA computer program package consists of four separate computer programs to be used in conjunction with one another: ADINA-IN, ADINA, ADINAT, and ADINA-PLOT. The ADINA programs are for the static and dynamic, linear and nonlinear finite element analysis of solids, structures, and fluid-structure systems.

Due to the large size of the ADINA programs, ADINA-IN, ADINA, ADINAT and ADINA-PLOT must be broken into smaller modules to minimize the amount of central memory occupied by the ADINA programs. If the ADINA programs occupy less central memory, then a larger finite element problem can be solved. Also, a user-friendly interface was developed to aid the users at HQ AFESC/RDC in executing any of the ADINA programs.

EXPERIMENTAL STUDY OF ISOTHERMAL FLOWS IN A DUMP COMBUSTOR

BY

Craig A. Langenfeld

The Ohio State University

Department of Mechanical Engineering

206 W. 18th Street

Columbus, OH 43210

ABSTRACT

Isothermal flows in a dump combustor were studied for configurations of no swirl and of weak swirl, S = 0.3. Detailed mean flow and turbulence measurements in the axial and radial directions were obtained using a two-component coincident LDV system. Mean axial and radial velocity, axial and radial turbulence intensities and Reynolds stress profiles are plotted. The relativity of the data to previous work in the same model but for the axial and tangential directions is discussed. For the no swirl case, the flow does not become fully developed flow even at 24 step heights downstream. Turbulence intensities and Reynolds stresses peak at a shear layer generated by recirculating flow for locations before reattachment and decay out further downstream. For both no swirl and weak swirl, the Reynolds stress in the axial-radial plane was greater than for the axial-tangential plane for the shear layer region between the main flow and the recirculating flow.

A COMPUTER SIMULATION OF A PLASMA ARMATURE RAILGUN

by

CHRISTOPHER B. [illegible]

ABSTRACT

A computer simulation for a plasma armature railgun was developed for use on a Zenith 248 micro computer. The purpose of the simulation is to predict gun performance both for design purposes and to estimate the results of specific shot conditions. The simulation models projectile velocity, power supply currents, armature mass, and armature length. These parameters are modeled using equations expressing their time rates of change and then using numerical integration. The acceleration includes terms for ablation and viscous drag effects, and the ablation is made velocity dependent. This gives good agreement with experimental results.

INVESTIGATION OF LASER COUPLING USING NONLINEAR OPTICS

by

Bruce W. Liby

Abstract

A discussion of the original goals is contained, as well as how they were changed and why. The pertinent operating characteristics of the laser diodes to be used are described, and recommendations for follow on experiments are presented.

Isolation of Osteogenic Cells From The Trauma-Activated Periosteum

by

A. Jeannine Lincoln

ABSTRACT

Adult male New Zealand white rabbits had greenstick-type closed fractures of the ribs induced in them under anaesthetic. The healing process was allowed to begin and progress. The fractured ribs were removed from the rabbit after five days from the time of fracture. Osteoblast-like cells were harvested and cultured from the bone and soft callous of the fracture sites. In an attempt to characterize the osteoprogenitor cells, biochemical assays were performed every 2-3 days on the media changes collected from each cell culture. These assays determined the total protein concentration, alkaline phosphatase activity, and glycosamino glycan content. The data obtained from these assays was used to characterize the osteoblast cells obtained from the trauma-activated periosteum since little is known about bone development from non-embryonic sources.

The Effects of Cataract Surgery
on Pupillary Response

by

Yolanda A. Malone

ABSTRACT

Patients responses after monocular cataract surgery were video taped via the use of a pupilpgrapher. The pupilographeer allowed filming of both eyes simultaneously. The pupils were then analyzed through the use of video editing equipment, at intervals of .125 seconds. The data was plotted as a function of time with respect to pupil size. Standard deviation for the right versus the left eye, surgically operated versus the unoperated eye and time were calculated. Maximum and minimum ranges were also examined. At completion there appeared to be no difference in response rate nor the degree of response in relation to the operated versus the unoperated eye in cataract patients.

Liquid Scintillation Counting with the Packard 1500 Analyzer

by

Randal L. Mandock

ABSTRACT

Alpha and beta particles were detected with the Packard 1500 Liquid Scintillation Analyzer. Six tests of the EPA Radon-222 in water by liquid scintillation produced results which agreed with the known activities within the uncertainty when three regions were analyzed. The alpha activity measured for Pu-242 was consistently high, although the majority of the measurements taken in Region B agreed with the known activity within the uncertainty. The alpha activity measured for Am-241 agreed well with the known activity for every measurement in Region B. Measured tritium activities decreased due to color quenching as urine color progressed from light to dark. Background determination was found to be a key element when measuring low levels of activity.

De-embedding S-parameter Measurements Using TSD Technique

by

James W. Mattern

ABSTRACT

Scattering-parameter measurement of devices embedded in microstrip lines are de-embedded using the Thru-Short-Delay method. A computer algorithm was developed to calculate the error adjustment terms needed to adjust the error matrix supplied by the network analyzer. The results are new error terms that shift the measurement plane to device level. The algorithm was tested successfully by using a pair of 10 cm airlines with APC7 connectors to simulate a pair of arbitrary launchers.

AN EXPERT SYSTEM FOR DIAGNOSIS AND REPAIR OF ANALOG CIRCUITS

by

Matthew B. McBeth

ABSTRACT

The purpose for this research project is to study the use of artificial intelligence in the domains of electronic diagnosis and repair. This paper will describe a framework for building expert systems in such a domain. I will concentrate on an amplifier circuit board that is frequently used in data acquisition systems at Sverdrup Technology. The system under development is designed to aid the technicians in diagnosing and repairing the amplifier board down to the component level. This system will detect a potential fault and have the technician either adjust, check, or replace a component. It will then verify whether that was the problem and make a record of all repairs. This paper will also discuss the knowledge acquisition techniques used for the system, and the knowledge that was gained from each.

PHYSIOLOGICAL MONITORING METHODOLOGY IN THE USAFSAM CENTRIFUGE

by

Jennifer B. McGovern

ABSTRACT

Loss of consciousness due to +Gz (G-LOC) has been identified as a cause of many mishaps and loss of aircrews and aircraft. Previous studies have suggested that physiological measures, especially the EEG, would be useful to monitor pilot consciousness. This effort endeavored to define appropriate methodologies (including electrode placement and choice of electrode) for use in a USAFSAM Centrifuge study of deliberate G-LOC. Physiological signals to be monitored included EEG, EMG, EOG, ear oximetry, and respiratory sounds.

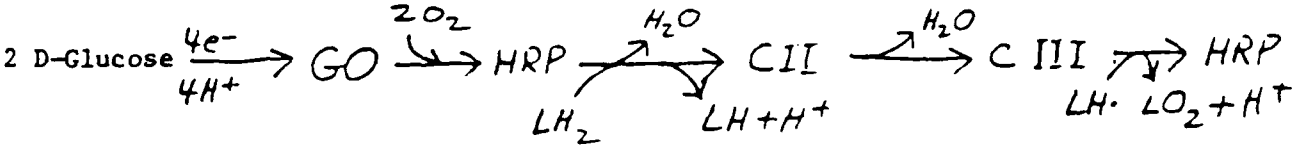
II Methods of Quantifying and Enhancing Reactive Oxygen Species Production

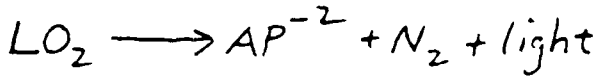
by

Roland A. Medellin

ABSTRACT

... Assays were run employing the reaction summarized as follows:





in which LH_2 is Luminol, CII is electron-deficient HRP, CIII is oxyperoxidase, LO_2 is peroxyluminol intermediate, and AP^{-2} is Aminophthalate. Glucose Oxidase, Horseradish Peroxidase, Luminol, and Bovine Serum Albumin were immobilized on 7mm filter paper disks. These disks when assayed by adding glucose demonstrated consistent, predictable enzyme kinetics, even when various inhibitors were added to the reaction mixture. We observed 150-fold greater chemiluminescence peaks in disks to which glucose was added compared to controls. When we added Catalase, only 4.4% of this chemiluminescence was typically observedwhile 15% of the chemiluminescence for glucose was seen when Bovine Serum Albumin was added. Peak chemiluminescence values were observed at characteristic times after adding glucose to the disks.

We also produced virus-sized nanoparticles (Glucose Oxidase + Horseradish Peroxidase), which produced 1300-fold greater chemiluminescence over controls when a mixture of glucose and luminol was added. These nanoparticles were able to penetrate a .2 um filter,and they retained their enzymatic activity for weeks. They produced 20-fold greater chemiluminescence over controls when immobilized on gel disks. When immobilized on gel disks, nanoparticles exhibited chemiluminescence values within the same order of magnitude 80% of the time. In preliminary tests Dr. Pruitt used nanoparticles to enhance RAW and P388 macrophage-like cell line support of CTLL cytotoxic lymphocyte proliferation.

APPLICATIONS OF DIFFERENTIAL GEOMETRY TO THE SHAPE ANALYSIS OF GRAY-VALUE IMAGES

by

Otto Michael Melko

ABSTRACT

A gray-value image can be viewed as a discrete analog of a smooth surface in Euclidean space . The shape of a smooth surface can be described by the gauss curvature and mean curvature of that surface . It is therefore reasonable to expect that the discrete analogs of these curvature functions would be useful in the shape analysis of digital (gray-value) images . Two methods for discreting these curvature functions are discussed . These methods are then used to write algorithms for shape analysis of gray-value images . Special attention is paid to the value of these algoritms for the identification of objects (such as tanks) in low resolution infrared images .

OZONATION OF FIREFIGHTER TRAINING FACILITY WASTEWATER AND ITS EFFECT ON BIODEGRADATION

by

Dennis D. Truax, Ph.D., P.E.

Ethan S. Merrill

ABSTRACT

Firefighter training at airports and airbases is a necessary activity generating wastewaters containing a combination of fuel, surfactant based firefighting agents, and particulates. The Air Force is engaged in an effort to develop a treatment scheme for these waste flows. At present, the biodegradability of the waste contained in these discharges is of some concern. This research briefly examined the impact of preozonation on microbial conversion of contaminates remaining in these wastewaters after gravimetric oil and particulate removal.

Based on the results of this project, it appears that adding ozone to waters containing jet fuel and/or surfactants will enhance biodegradation of the substituent organics. For waters containing only fuel, it seems that organics are converted to a more biodegradable form with the degree of degradability increasing with ozone addition. The surfactant studies, and to some extent the wastewater studies, indicate a threshold and an optimum ozone dose exist. The threshold occurs when the surfactants' bioinhibitory nature is destroyed and the microbial utilization of organics resulting from waste oxidation can proceed. However, once the optimum is reached, ozone-based oxidation destroys these organics at a rate equal to or greater than their production.

The Feasibility of a Laboratory Information Management System For The Analytical Chemistry Laboratory

by

Veronica S. Minsky

ABSTRACT

Microcomputer controlled laboratory instruments have accelerated the rate of sample analysis. The paperwork associated with sample processing has not kept pace. A laboratory information management system (LIMS) may improve sample processing, reporting and allow result entry directly from instruments. A LIMS system may accept results directly from most instruments with an RS-232 or IEEE 488 port. Interfacing involves two processes; first the electronic transfer of data from the instrument to the LIMS must occur, which is often an easy task, especially with newer instruments. Second the data must be transformed from the format of the instrument into the format of the LIMS database. Standardization of this process may be possible using standard forms to identify data items. Each instrument would have a custom program to identify the data items in a standard form. Each LIMS system would reformat the data from the standard form into the format of the particular LIMS database.

Investigation of the Potential Impact of New Photonic Materials on Optical Processing Systems

by

Frank W. Moore

ABSTRACT

This report summarizes research efforts conducted during the 1987 Graduate Student Summer Support Program research term at AFWAL/AADO, Wright-Patterson Air Force Base, Ohio.

Claims for the speed and dynamic range characteristics of new photonic materials suggest that these materials could permit the development of competitive optical processors. The high resolution claimed for these materials may make them suitable for numerous information processing tasks, including memory, analog-to-digital conversion, multiplication, and two-dimensional image processing.

Non-cascadable Boolean operations have been demonstrated. Analog addition of two-dimensional images appears to be possible. Qualitative experiments suggesting uses of new photonic materials in optical systems have been performed, general properties of these materials have been determined, and future quantitative tests required for precise material characterization have been proposed. Several multiplication schemes, aimed at performance which would be competitive with state-of-the-art electronic multipliers, are also proposed.

A REVIEW OF WORKLOAD MEASUREMENT IN RELATION TO VERBAL COMPREHENSION

by

Stephen T. Morgan

ABSTRACT

In a command and control environment, many individuals are called upon to engage in two activities simultaneously. Communication with others is often one of these tasks. It is crucial that there be no decrement in performance on either task, especially in crises situations where heavy loading on the cognitive system is apt to be present. In order to optimize an individual's performance, processing strategies need to be analyzed and the most efficient ones incorporated into appropriate training programs.

This paper reviews the literature regarding workload measurement techniques. The purpose is to investigate the most efficacious method of assessing processing load during verbal comprehension. Dual-task paradigms are found to be valid indices of mental workload. Problems associated with this technique are evaluated and a possible assessment method is offered.

DEVELOPMENT OF A LONG TERM SOLVENT DELIVERY SYSTEM

by

Lisa M. Morris

ABSTRACT

The basic principles have been established for developing a long term organic solvent delivery system. This system would be useful in studying neurobehavioral toxicity of various organic chemicals. 1,1,1 trichloroethane (TCE) was delivered *in vitro* from a 0.2 ml reservoir ALCAP (aluminum-calcium- phosphorus oxide) ceramic delivery system. A sustained release of 1,1,1 TCE was attained for 15 days with a release rate of 0.65 mg/hr. A modified 2 ml reservoir ALCAP solvent delivery system had a sustained release of 28.8 mg/hr for four hours. *In vivo* intraperitoneal implantation of the 2 ml reservoir produced a sustained release of 6.9 mg/hr for 2 days as monitored by blood levels of 1,1,1 TCE. Release declined for the following six days. The data obtained in this investigation suggest that this simple device can be used for long term delivery of organic solvents.

A New Sensitive Fluorometric Method for the Analysis of Submicrogram Quantities of Cholesterol

by

Dr. Leonard Price and Conrad Murray

ABSTRACT

Two fluorescent compounds, 3-chloroformyl-7-methoxycoumarin (3-CMC), and 7-dimethylamino-1-naphthaline sulfonyl chloride (dansyl chloride) were studied as possible derivatizing agents for the analysis of submicrogram or trace levels of cholesterol. 3-CMC was synthesized and its yield, melting point, and chromatographic properties determined. Reaction conditions for the preparation of the fluorescent cholesterol ester of 3-CMC were established. Dansyl chloride did not react with cholesterol. 3-CMC provided good sensitivity for the detection of cholesterol. This method should permit the analysis of cholesterol in small serum samples or in biological fluids where cholesterol concentrations are very low.

Model-free Statistical Analyses of Contaminated Ground Water

by

Joseph S. Bierocci

and

Steven J. Naber

ABSTRACT

A detailed statistical analysis of two plumes of contaminated ground water at Wurtsmith Air Force Base in Michigan serves as a prototype for analyses that may be conducted at other sites. The statistical techniques include graphical methods based on spline smoothing, regression methods for quantifying bias, and nonparametric methods for assessing trends. Because the results of these analyses depend only minimally on assumptions about solute transport, they can be used either as prima facie evidence or to provide a check on the applicability of various plausible solute transport models.

Given the short length of time series available at most sites where ground water is monitored, there are currently few alternatives to solute transport models for assessing time trends. New research on probability distributions of ranked data offers hope for combining information from various wells in a region in order to assess regional trends and patterns for short time series.

A Human Factors Evaluation of the Advanced Visual Technology System (AVTS) Eye Tracking Oculometer

by

Jerome I. Nadel

ABSTRACT

A human factors evaluation of the Honeywell helmet mounted eye tracking oculometer system was conducted. Experimental tests were directed at identifying the physical and anthropometric factors that lead to both successful and unsuccessful oculometer operability. Pupil size of the user was found to be the most significant factor affecting system performance. Other factors affecting system performance were interpupillary distance (IPD) and helmet fit. It was recommended that the electronic pupillary signal from the systems IR camera be amplified. This, in combination with a lower system pupil threshold, should ensure measurement accuracy for at least 80% of the user population.

The Effects of Increased Cognitive Demands on Autonomic Self-regulation: An Indicator of Parallel Processsing in the Brain

by

Victoria Tepe Nasman

ABSTRACT

A parallel processing scheme is proposed. We tested that scheme through a single-subject experimental design in which subjects performed several tasks. Ongoing electroencephalographic signals were recorded over left and right occipital cortex, and compared between tasks within session. As expected, while performing various meditation and biofeedback tasks, subjects demonstrated characteristic dominant frequencies of 7-13 Hz (alpha). When performing such a task concomitant with another highly associative cognitive task, however, subjects produced results more like those obtained in the performance of the cognitive task alone. These results support the notion that, while engaged in tasks which would require parallel brain processing, processes which would otherwise rely upon serial processing are "uncoupled." We propose a scheme upon which to base this interpretation. Although performance data on the cognitive task have not yet been thoroughly analyzed, our preliminary interpretation of the data is that we have obtained evidence to support a view of cognitive processing in which the flexibility to process either serially or in parallel exists, and in which the type of processing that is invoked will coincide with the demands of the task or tasks being performed.

Mark Neumeier

No Abstract Submitted

At This Time

VAPORIZATION BEHAVIOR OF MULTICOMPONENT FUEL DROPLETS IN A HOT AIR STREAM

by

Suresh K. Aggarwal* and K. Nguyen**

Abstract

An experimental-theoretical investigation of the behavior of evaporating fuel droplets in an hot air flow was initiated. In the theoretical part, a computer code was developed to calculate the droplet size, velocity, and surface properties along its trajectories. The major features of the code are (i) three different liquid-phase models, namely the diffusion-limit, infinite-diffusion, and vortex, can be employed, (ii) Two gas-phase models used for the external convection effect on the transport rates are the Ranz-Marshall and the axisymmetric models, (iii) vaporization of pure as well as multicomponent fuel droplets can be predicted, and (iv) variable property effects are considered. A parametric study was completed, where the predictions of the three liquid-phase models were compared, and the variable-property effects were evaluated. From these results, the operating conditions for the experimental study were identified.

In the experimental part, the facility to inject a single stream of droplets in well-characterized hot air flow was set up. A LDV system and a thermocouple measure the local air properties. The droplet properties were measured by the Phase-Doppler particle analyzer and photography. Several tests were completed to fully characterize the experimental conditions. In future, the focus will be to compare the experimental and theoretical data for laminar flow conditions. The study would be then extended to turbulent flows. The future work is described in the Research Initiation Proposal.

* Assistant Professor
** Graduate Student

Growth Curve and Phototaxis Assays

of Axenic Chlamydomonas reinhardtii 125

by

Wendy Nguyen

ABSTRACT

Experimental procedure began with the inoculation of algal cells from a 5-day HSA plate to 5 HS and 5 HSA plates. Two plates, HS and HSA, were sampled every 6-9 hours for 70 hours then at 12 hour interval until 135.5 hours. With each sample, a cell count was done on the ZBI electronic Coulter Counter from which the cells/ml value was calculated. The cells/ml value was then used to construct a growth curve of the C. reinhardtii 125. Percentage motility of the culture was also observed microscopically by the hanging drop technique. The remaining 8 plates of HS and HSA were sampled primarily to determine phototaxis assays on the algal cells for 96 hrs and to observe the effect of the different types of culture medium on phototaxis. Growth Curve of pure C. reinhardtii resembled closely that of the contaminated algae in both HS and HSA media. Experiments showed also that axenic cultures grew better in HSA than HS media. However, phototaxis assays showed that HS grown algal cells were more phototactic than HSA grown cells since after 24 hrs of

MICROESOTROPIA PATIENTS PERFORM WELL AS MILITARY JET PILOTS

by

Bernadette P. T. Njoku

ABSTRACT

A computer listing of all patients examined at Brooks AFB with the diagnosis of microesoptropia(sometimes referred to as microstrabismus, monofixation syndrome) is obtained. Key terms, especially used to determine patients not clearly defined as microesotropics include: a) failed depth perception, b) anisometropia, c) esotropia/esophoria, d) strabismus, e) microexotropia, f) hyperopia/hypermetropia, g) suppression/amblyopia, h) monofixation syndrome, i) diplopia(not monocular), j) heterotropia/strabismus and k) failed red lens test. (Not until 1980 were the physicians at Brooks AFB alerted to keep specific records of microesotropia patients.) The patients' charts, mainly pilots and navigators, are studied and specific information is gathered, then transferred to individual 'microstrabismus data sheets'. From this, six straightforward graphs are constructed: 1) Refraction Spherical Equivalent vs Patient #, 2) Refraction Cylinder Astigmatism vs Patient #, 3) Verhoeff(no. passed/8) vs Patient #, 4) Howard-Dolman vs Patient #, 5) Alignment vs Patient # and 6) Stereo Arc Sec vs Patient #. These data and graphs allow primarily for at-a-glance obtaining of quantitated information and comparisons from patient to patient; and thus, subsequent in-depth judgement and theories to by made by Maj. Dr. L. Tychsen and Col. Dr. Thomas Tredici.

Determination of Lumped-Mass Thermal Properties Associated With Autoclave Curing of Graphite/Epoxy Composites

by

Charles W. Norfleet

ABSTRACT

Determination of the parameters affecting the thermal response of a graphite/epoxy composite was performed. A governing equation was developed for the process based on lumped-mass heat transfer principles. Numerical values of the thermal properties included in the energy balance equation were determined by a Newton-Raphson root solving method. The results of this method indicated that the bagging material surrounding the laminate during the cure process had significant thermal mass which created a slow response during the initial heating of the laminate. This observation led to the development of energy balance equations for both the bagging material and the laminate.

EQUITABLE SAFETY STOCKS FOR USAF CONSUMABLE ITEMS

by

Douglas E. Phillpott

ABSTRACT

Current safety stock policy of the United States Air Force provides for different levels of absolute protection from backorders for different consumable items. In a group of items considered to be equally important to mission capability, current policies lead to different amounts of absolute safety stock protection for different items. The purpose of this research was to introduce equitable safety stock protection for consumables in a given mission impact code (MIC) category.

Research findings indi ate that by adopting the equity policy proposed, annual backorders can be decreased by 3.7% with a corresponding increase of 2.9% in inventory investment. In addition, the equity policy offers the opportunity to optimize inventory dollars and reduce inventory investment in less critical items.

Investigation of Expert System Design Approaches for Electronic Design Environments

by

Susan A. Poppens

ABSTRACT

The intent of this project is to investigate various schemes that are available for the design effort of electronic systems. The information is to be incorporated into a knowledge base to determine approaches for a particular design. Various design methodologies are to be investigated for their appropriateness and application in the aforesaid design environment.

The second phase is to focus the knowledge base gathered in the design effort for electronic design. This knowledge base is to be incorporated into a rule based expert system which can be utilized by the design engineer in the design/development of functional specifications.

Thermal Stability Characteristics of A Nonflammable Chlorotrifluoroethylene CTFE Base Stock Fluid

by

Vijay K. Gupta and Mark Prazak

ABSTRACT

Thermal stability characterisitcs of a nonflammable chlorotrifluorethylene CTFE base stock fluid MLO 86-7 have been investigated as function of time and temperature via micro-thermal stability tests. It has been found that this fluid is a complex mixture of chlorofluorocarbon compounds. The fluid was found thermally stable when stressed for 22 hours at 246.1°C or below, but when stressed at temperatures above 246.1°C, degradation was observed, and the extent of degradation increased with the increase in stress temperature. The fluid degraded severely when stressed at 315.6°C for 22 hours. When the fluid was also stressed at 176.7°C for 260 hours, some degradation of the fluid was observed as indicated by change in acid number. The increase in acidity of the fluid caused by thermal degradation process might be producing corrosive products that may be harmful to system components.

CONTROL AND USE OF UNSTEADY FLOWS: INSECT USE OF VARIOUS WING KINEMATICS AND RELATED PRESSURE MEASUREMENTS USING A PITCHING AIRFOIL

by

Mark Andre Reavis

ABSTRACT

Based on a detailed analysis of insect flight kinematics, pressure measurements were made from a NACA 0015 airfoil undergoing a constant pitch motion carried to high angles of attack. Previous work revealed the important contribution that high pitch rates and high angles of attack play in dragonfly flight kinematics. Changes in the initial angle of attack, pitch displacement angle, pitch amplitude and non-dimensional pitch rate altered the integrated values of C_l and C_d in a reproducible and predictible manner. Pitching profiles were varied to provide different initial conditions for vorticity accumulation: 1) starting at 0 degrees and pitching at constant rates to different maximum angles, 2) varying alpha initial and pitching to an alpha final of 60 degrees, and 3) varying alpha initial but holding the displacement angle constant. All of the above tests were conducted at alpha plus values of 0.1 and 0.5. These results suggest that dynamic pitch motions of an airfoil can enhance lift even if the pitch motion is initiated beyond normal static stall angles. Also, an optimal maximum pitch angle exists which enhances the unsteady lift potential while minimizing drag.

AIRCRAFT REFUELING DEMONSTRATOR USING A MICROBOT ALPHA II ROBOT

by

Bryan P. Riddiford

ABSTRACT

A demonstration was set up using a Microbot Alpha II robot to study the feasibility of robotic ground-based aircraft refueling for use in chemically and biologically hazardous environments. An overhead gantry with the robot hanging beneath was designed to provide the easiest access to the aircraft midair refueling port. A 1/12 scale model of an F-16 was underneath and acted as the receiving aircraft. The midair refueling port was used so little or no modification was needed to accommodate existing aircraft. The robot was controlled by a Zenith-100 computer.

Influence of Moving Visual Environment on Saccadic Eye Movements and Fixation

by

Keith A. Riese

ABSTRACT

Saccade parameters of amplitude, peak velocity, duration, and latency were compared for a stationary visual background environment versus a moving visual background environment to determine environmental effects. For visual stimuli, latency differences were significant ($p < 0.005$) while all other parameter variations were not. Mean saccade latency for a stationary visual background was 161.7 msec while for a moving visual background the mean latency was 175.3 msec. Saccades made in the same direction as the moving background showed minor variation as compared with those made in the opposite direction. No significant differences in saccade parameters were found when audio stimuli were used. Also, no parameter significance was found between target fixation and pseudo-target fixation.

Thermal Stress and Its Effects on Fine Motor Skill and Decoding Tasks

by

M. Carolyn Robinson

Abstract

The current thermal research being done on the Chemical Defense Ensemble (CDE) has focused on work productivity as measured by the amount of time a subject is engaged in gross motor movement. To help determine if thermal stress has an effect on fine motor and cognitive skills, two tasks were utilized to measure any change in these skills. The fine motor skill task was a hand-eye steadiness task; the cognitive task was a decoding task. An examination of the data indicated that under the thermal stress induced by a work-rest protocol resulting in a cyclic body core temperature (Tre), 1) there appears to be a trend between Tre and fine motor performance; 2) there does not appear to be a trend between Tre and decoding performance.

An examination of the data from this study indicates that personnel experiencing a cyclic variation in Tre may preserve cognitive functioning, but may suffer a decrement of steadiness performance. The results of the decoding task may be an indication that the task utilized is not sensitive to Tre.

LOW VELOCITY IMPACT OF GRAPHITE/EPOXY PLATES

by

William E. Wolfe
Gregory A. Schoeppner

ABSTRACT

Instrumented drop weight impact tests were conducted on laminated graphite/epoxy panels. Impact velocity as well as the load time history were recorded for each specimen tested. The impactor was a hardened steel hemispherical tup to which a variety of weights could be attached. Impactor weights used in this study ranged from 9.5 pounds to 103.5 pounds. The graphite epoxy panels tested were either 0/90 or ± 45 degree layups made in thicknesses of 16 and 32 plies. Correlations were made between the amount of damage expressed as damage area and the impact energy. The amount of damage was found to be dependent upon the energy at impact and to a somewhat lesser degree on the velocity of the impactor.

DESIGN OF A MECHANISM TO CONTROL WIND TUNNEL TURBULENCE

by

Filiberto Santiago

ABSTRACT

My appointment period for the 1987 U.S.A.F.- Graduate Student Support Program was from 6/1/87 to 8/7/87. I worked as Research Assistant to Dr. Marco A. Egoavil and under the supervision of Mr. Daryl Sinclair/CALSPAN'S Technology Applications Section. The following report covers my assignment for the ten week period.

The research investigation was performed in the Arnold A.F.S./Acoustic Research Wind Tunnel. An intense literature survey was done during the first weeks covering the fundamental aspects of the "TURBULENCE" phenomena. Turbulence of the air stream is generally recognized as a variable of considerable importance in many aerodynamics phenomena, specially those observed in wind tunnels.

In the Acoustic Research Wind Tunnel turbulence was generated in the stilling chamber using two devices. First a grid 20.5 in. by 20.5 in. with 1/2 in. diameter rods. This grid was used in two ways, one the grid by itself and the other the grid with small tags attached to the horizontal center line and to the vertical center line. Second a manifold with fourteen jets producing a flow of air perpendicular to the main stream flow in the wind tunnel.

The turbulence level of the tunnel empty is approximately 3%. The goal was to at least obtain 6% or more of turbulence and according to some of the experimental runs it is possible to get up to 23.4% which is very encouraging by the use of jets.

Experimental Combustion Techniques

by

James P. Seaba

ABSTRACT

Several small experiments reguarding different combustion phenomenia were explored. A new diagnostic tool known as the phase doppler anenometer was used in a spray environment. It measures droplet size and velocity. Diffusion flame work was completed from last summers work. Other experiments include a multiple jet flame, and multicomponent evaporation of a droplet.

THE INTEGRATION OF DECISION SUPPORT PROBLEMS INTO FEATURE MODELING BASED DESIGN

by

Jon A. Shupe

ABSTRACT

This report is an effort to consolidate and report about components of the design environment. In this report, design is discussed as being composed of decisions of various types and activities. These types and activities are set forth and described. Further, Feature Modeling as posed by the Materials Lab is discussed, as well as the relationship of decision making to Feature Modeling. Finally, it is posed that an appropriate and useful design environment will utilize a balance of knowledge based techniques and numerical decisionmaking algorithms, such as the Decision Support Problem technique for solving design problems. Several scenarios where this blend would be useful are discussed.

OPTIMAL CONTROL OF THE WING ROCK PHENOMENON

by

Christopher D. Sierra

ABSTRACT

The nonlinear phenomenon of the wing rock of a slender delta wing about the mid-span axis was chosen for study. Time histories of the roll angle and the roll angle velocity were obtained and used to verify the results of the phase plane analysis of Nayfeh, Elzbeda and Mook. A simulation of the pilot changing the angle of attack of the wing was implemented in order to observe the effect the manuever had on the behavior of the uncontrolled system. The time history of the build-up of wing rock was developed. The need for a method of controlling this phenomenon was observed. A control was then obtained using optimum systems control. The optimal control was also found for the system experiencing an "unexpected" pulse. The time histories of the roll angle for both cases were obtained.

Professor Patten's Sub-Optimal Control Algorithm was also used to obtain a control for this wing rock phenomenon. These results were presented so that a comparison between the two optimal control techniques could then be made.

CALIBRATION AND DATA REDUCTION TECHNIQUES FOR THE AFGL INFRARED ARRAY SPECTROMETER

by

Gregory Sloan

ABSTRACT

AFGL's Infrared Array Spectrometer has now taken data at the Wyoming Infrared Observatory on three occasions. This data has been used to calibrate the array and to test data reduction schemes. I present here the results of this effort: a calibration and data reduction algorithm for future use with the instrument.

Thermal conductivity of isotopically pure semiconductors, superlattices, semiconductor alloys, and semiconductors as a function of temperature; control of the segregation coefficient in LEC crystal growth; and photo-Hall measurements of GaAs.

by

Elisabeth Smela

ABSTRACT

A table of isotopes was prepared. Literature searches on the effects of isotopes on thermal conductivity, the thermal conductivity of superlatices, the control of the segregation coefficient in LEC crystal growth, and on the relationship between In doping of GaAs and both CRSS and thermal conductivity were completed. Computer programs were written to evaluate the phonon mean free path and the thermal conductivity as a function of alloy composition. Finally, photo-Hall effect measurements were done on several GaAs samples.

PREDICTING OPTICAL DEGRADATION OF A LASER BEAM

THROUGH A TURBULENT SHEAR LAYER

by

Rita Rex Smith

ABSTRACT

The degradation in optical quality of a coherent laser beam passsing through a turbulent shear layer has been predicted by relating the phase error of the coherent beam to the time-mean index-of-refraction profile across the shear layer. The prediction of the optical degradation is, therefore, dependent on the accuracy of the model used to analyze the turbulent shear layer. The turbulence model in the ALFA shear layer code was investigated. A code was developed to calculate the index-of-refraction profile, phase error, and Strehl ratio using the results of the turbulence analysis from ALFA and plot the significant turbulence parameters.

The above method employs a mixing-length assumption. A better approach would be to predict optical degradation by relating the phase error to index-of-refraction fluctuations, eliminating the need to make a mixing-length assumption. The scalar fluctuation equation in the ALFA code and a perturbation of the Gladstone-Dale relation were examined for this purpose.

EXPERIMENTAL TESTING OF IMAGING CORRELOGRAPHY

by

Jerome Knopp

and

Brian K. Spielbusch

ABSTRACT

An experimental verification of imaging correlography was completed. A laboratory testbed was set up using a CCD camera to collect speckle data from a diffuse object. The collected data was averaged and processed to estimate the Fourier modulus (FM). The FM was then used to estimate the image of the diffuse object using phase retrieval algorithms. A high quality image was recovered using approximately 1200 frames of speckle data.

AN ASPECT GRAPH-BASED CONTROL STRATEGY FOR 3-D OBJECT RECOGNITION

by
Louise Stark

ABSTRACT

Several researchers have described methodologies for three-dimensional object recognition which use nonlinear optimization as a control strategy for matching features of a three-dimensional object model to features found in an image. An acknowledged problem with this type of system is how to efficiently choose a set of starting parameter estimates so as to avoid recognition errors due to local minima. This paper presents a new methodology for applying nonlinear optimization in three-dimensional object recognition. Our method enumerates a complete set of relevant starting points for each object model by choosing one starting point for each viewing cell defined by the aspect graph of the object. Constrained nonlinear optimization is used to find a minimum within each viewing cell. Examples are given to illustrate how recognition errors can occur due to local minimum found from poor starting parameter estimates, and how the methodology based on the aspect graph object models eliminates this problem.

LINEAR PROGRAMMING FOR AIR FORCE DECISION AIDING

by

Steven J. Steinsaltz

ABSTRACT

The program "Enemy Sortie Capability Measurement Aid" was examined to determine what was required of a linear program solver so that it could replace the commercial package being used. A program was written in PASCAL, using the upper bound form of the revised simplex method, and various problems with memory had to be overcome. The completed program took 23 minutes to solve, compared to three minutes for the commercial package. The program was rewritten in C, and when debugged ran in ten minutes. This was improved upon by changing the program so that, instead of using the revised simplex method, which saves memory (a problem not faced in C), the regular simplex method was used. This improved the running time to seven minutes, within the bounds desired.

Creating Aspect Graphs for Use in Object Recognition

by

John H. Stewman

ABSTRACT

This paper is concerned with the creation of aspect graphs for use as object models in a 3-D object recognition system. A method is presented which directly creates the aspect graph of a convex planar-face object from its boundary surface representation. The aspect graph created by this process is an undirected graph. Each node in the graph has attributes describing one aspect of the object and the cell of space from which that aspect can be viewed. Each arc in the graph indicates an adjacency between two aspects and is attributed with the plane separating the two associated cells. This representation is consistent with that originally proposed in [Koen79]. There are two significant differences between this approach and others of which I am aware. First, determination of the structure of the aspect graph is done in a direct manner based on the geometry of the object. The resulting aspect and cell descriptions are exact rather than approximate. Second, the cell associated with each aspect is a true 3-D volume of space rather than a surface patch on a viewing sphere.

Analysis of Emission Features in IRAS LRS Spectra

by

Tod Strohmayer

ABSTRACT

I have done a study of IRAS low resolution spectra (LRS) of variable M stars. Specifically I have looked at the 1n class of LRS spectra in order to study the various types of emission features seen in these spectra. Although classified by the IRAS science team as 'featureless' spectra I find that approximately 30% of the spectra have emission features in the 9 to 15 micron region. The average excess emission above the local continuum is about 7% and ranges from as low as 2% to as high as 20%. Emission due to silicates at about 10 and 18 microns is seen as well as emission due to silicon carbide at 11.6 microns. A large number of objects show a broad feature between 9 and 15 microns usually centered between 11 and 12 microns. It is not clear yet whether the feature is due to carbon rich or oxygen rich dust, and may possibly be evidence for evolution from spectral type M to C.

In order to facilitate this study I have written and modified computer programs which allow the user to graphically analyze the LRS data. I have implemented programming that allows the user to fit the local continuum using two models. The first allows the user to co-add 2 blackbody distributions, each normalized to a different region of the spectrum, to obtain the continuum. The second employs a simple dust shell model to estimate the continuum. Another program calculates color corrections to the IRAS broad band fluxes.

Centrifuge Modeling of Projectile Penetration in Dry, Granular Soil

by

Teresa Taylor

ABSTRACT

Centrifuge tests designed to investigate projectile penetration depths in dry, granular soils were performed. A major objective of the tests was to determine the need for centrifuge testing to achieve similitude between model and prototype for this phenomenon. Penetration testing was accomplished using a pistol with interchangeable barrels to fire spherical projectiles of brass, aluminum, nylon and polyvinyl chloride at vertical impact angles into dry Ottawa Flintshot sand prepared at an average density of 17.54 kN/m^3. The sand samples were formed using a special large-scale sand rainer constructed specifically to produce 0.46 m diameter, uniform density samples for centrifuge testing. The modeling-of-models technique used in the centrifuge tests, along with results from complementary 1-g tests also performed, confirmed the need for centrifuge testing to investigate penetration depths in cohesionless soils.

Optical Interconnections for Digital Image Coding

by

Tien N. Tran

ABSTRACT

To achieve very compression rate, Digital Image Coding algorithms are becoming more complicated than ever. Combining this with high speed nature of image processing, transmission, parallel and pipeline processing have to be involved with the help of multiple processing units type architecture. Because of the large number of cells or chips involved, communications between cells or chips pose many problems. Optical interconnections seems to offer a hope for a solution.

AN INVESTIGATION OF PERFORMANCE IMPROVEMENT IN KNOWLEDGE-BASED CONTROL SYSTEMS

by

John M. Usher

ABSTRACT

The use of knowledge-based systems in real-time process control is a relatively new application. Even though there is much interest in this area, developers and users are reluctant to utilize the full potential that the knowledge-based system can offer. This restraint is due to the problem of resolving conflicts in the control actions prescribed by the system. In most cases, a human operator is made an integral part of the control system by requiring him to select the action to implement from among the alternatives offered by the system. This paper proposes a new method for resolution of conflicts which uses deterministic process knowledge in addition to heuristics and statistics. It is hoped that such a system will encourage removal of the operator and use of the system in a fully automatic mode of operation. To further enhance the system an idea is presented for the incorporation of a learning system to allow for on-line automatic editing of the process knowledge contained in the knowledge-base. This configuration results in a coupled system which uses dynamic deterministic and heuristic knowledge to resolve process conflicts which arise.

Computer Modeling for Surface Properties of Carbon Fibers

by

Pretta L. VanDible

ABSTRACT

Defining the structure of carbonaceous materials required extensive computer solutions of several mathematical models. Pressure vs volume experimental data was displayed graphically to observe the shape of the curve. The external surface area as well as the interna. surface areas of macropores and mesopores was defined b. the BET method. The solutions of the Dubinin-Polanyi and Dubinin-Astakhov equations gave the micropore surface area. The estimation of the shape of the pores was determined b. solving a series of mathematical equations. The numerical solutions yielded average pore radius, volume ratio, adsorbed volume and surface area of the pore walls.

An Advanced Vision System Testbed

by

Robert G. Trenary
Louis Tamburino
William VanValkenburgh

ABSTRACT

The design for a system which automatically extracts meaningful features from a set of images is described. The features are used as the basis for a classifier. The adaptation of the system is based on an evolutionary algorithm enlightened by learning strategies which use knowledge gathered about the problem domain during the training process. The experiments are implemented using an image processor which provides parallel operations in a novel and efficient manner.

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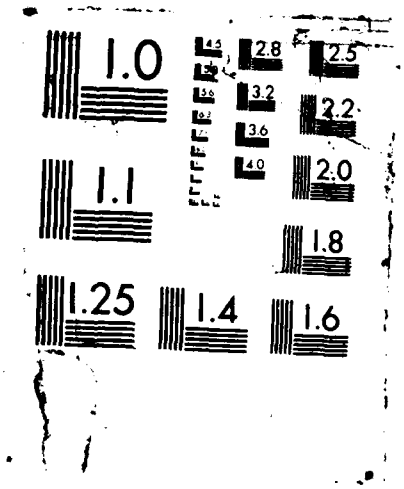
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Numerical Calculations of Dopant Diffusion involving flashlamp heating of silicon

by

Joseph C. Varga

ABSTRACT

Work was begun on finding a solution to the flashlamp heating of a doped semiconductor. A Blackbody spectrum was assumed for the incident radiation. Also, the absorption coefficient was assumed to follow a Lorentzian lineshape. Finite difference techniques were used. The diffusion of dopant through a semiconductor was calculated. A comparison was made between an analytical solution and numerical calculation. The results agreed to within 0.002%.

Scanning Electron Microscopy of PBO, PBT, and Kevlar Fiber

by

Deborah L. Vezie

SUMMARY

Samples of Dow PBO (poly-p-phenlyene benzobisoxazole), Celanese PBT (poly-p-phenlyene benzobisthiazole), and Dupont Kevlar-PPTA (poly-p-phenlyene terepthalamide) fibers were surveyed by scanning electron microscopy in order to correlate fiber structural features with varying processing conditions and varying properties. Different fibers showed minor morphological differences in the fiber surface and the kink band structure, but major differences were found in the liquid nitrogen fracture surfaces. All PBO fiber fracture surfaces showed some "ribbon-like" fibrillar bundles at a scale of 1 to 10μm, similar to PPTA, but unlike PBT. Kevlar 49 showed 200-500 nm pleats along the length of the fracture surfaces whereas Kevlar 149 did not, indicating that improved modulus of Kevlar 149 may be due to "straightening out" of pleats.

James W. Wade

ABSTRACT

A space-based rail gun has many possible uses, one of which is a component of a space-based defense network. Stringent pointing requirements are placed on a rail gun to be used for this purpose. Disturbances to the rail gun may significantly affect pointing accuracy. Possible sources of disturbances identified in this study include: on-board equipment, rail vibrations, environmental torques, and slew-induced deformations. Slewing deformations are studied by including the coupling of the slew dynamics with the Bernoulli-Euler beam model. The slewing disturbances are modeled, with control methods suggested to overcome the resulting pointing errors.

Hole Diameters in Plates Impacted by Projectiles

by

Randall F. Westhoff

ABSTRACT

During my research period at the Armament Laboratory, I evaluated the hole diameter and rod loss models of SPADE, a program designed to calculate the damage to an array of spaced plates impacted by a projectile. Comparison with actual test data showed that the hole diameter model was only accurate under certain impact conditions. Using experimental data and curve fitting techniques, I was able to modify the hole diameter model to achieve greater fidelity over a broad range of test conditions. The only available data on rod loss was from the original report which suggested the rod loss model currently used by SPADE. This report also verifies the accuracy of this model.

HUMAN RESPONSE TO PROLONGED MOTIONLESS SUSPENSION IN FOUR TYPES OF FULL BODY HARNESSES

by
Terri Wilkerson

ABSTRACT

The ability to withstand prolonged suspension while being restrained by fall protection harnesses is of vital interest to occupational safety. A fallen worker may be suspended in a fall protection harness for an indefinite period waiting for rescue. This experiment was conducted using volunteers to evaluate the relative capabilities of four types of full body harnesses (FBH) to provide occupant body support and restraint during post-fall suspension. A series of 42 randomized tests were conducted to evaluate the physiological effects and subjective responses to prolonged, motionless suspension in four different designs of FBH. Measured physiological parameters included blood pressure, heart rate, and respiratory rate. Subjects were passively suspended in each of the four harness configurations until subjective tolerance was reached prompting the subject to request termination of the test or until symptoms developed which prompted a medical decision to end test. Nonparametric analysis of the test durations was conducted using Wilcoxon paired-replicate rank test. Subjective symptoms which prompted test termination were analyzed for the relative occurrence frequency in each harness configuration. Based upon suspension duration and subjective response data, the FBH-C appears to be the superior harness configuration. The median duration period in FBH-C was 28.36 min with symptoms of nausea and changes in thermal sensations occurring most frequently as the reason for test termination. FBH-D

suspensions had a median duration of 26.66 min and FBH-B had a median time of 18.36 min, with light-headedness and nausea for both harness designs most often ending a test. Motionless suspension in FBH-A lasted a median duration of 17.05 min with the primary symptoms of nausea, change in vision, and decreased heart rate terminating most tests.

Douglas Wise

Late Appointment

No Abstract Submitted

At This Time

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